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THE VETERINARY JOURNAL

EDITED BY

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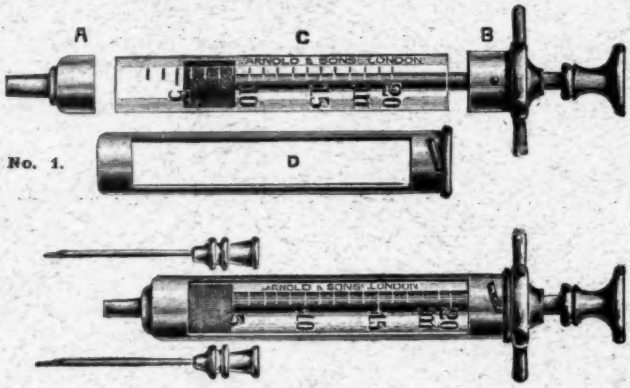

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CONTENTS.

	PAGE
EDITORIAL—	
Contagious Diseases in England	1
EMINENT MEMBERS OF THE PROFESSION	3
ORIGINAL ARTICLES	4
VETERINARY TOXICOLOGY	39
TRANSLATIONS AND EXTRACTS	44
REVIEWS	53
BOOKS AND PERIODICALS, &c., RECEIVED	60
COMMUNICATIONS &c., RECEIVED	60

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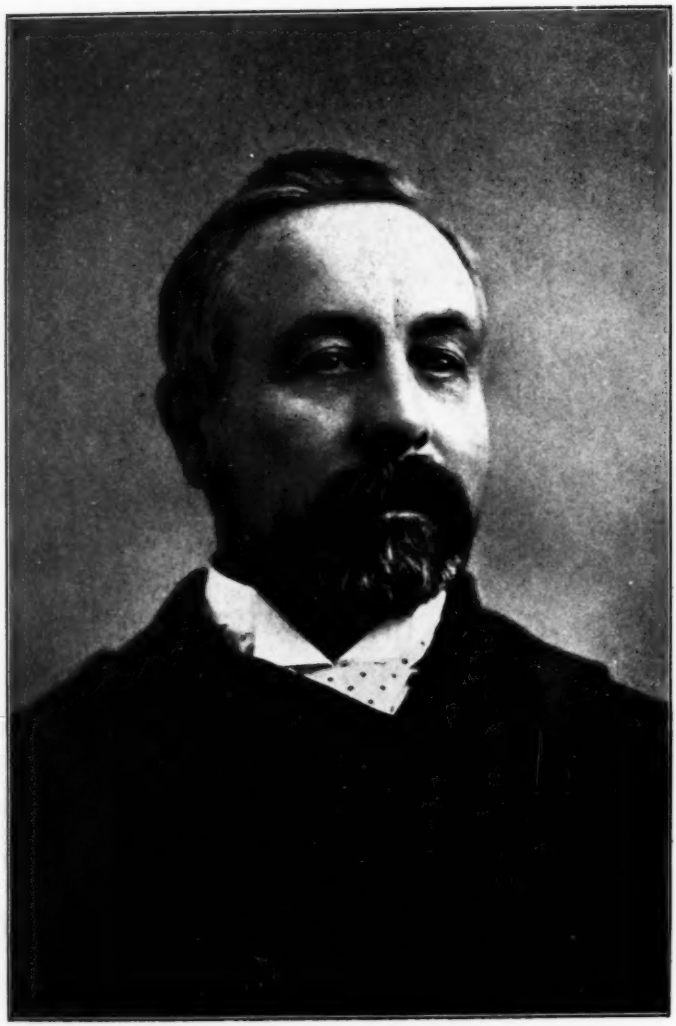


DUNCAN McNAB McEACHRAN, F.R.C.V.S.Lond., D.V.S.
McGill University, Montreal.

THE

VETERINARY JOURNAL

JULY, 1905.

Editorial.

CONTAGIOUS DISEASES IN ENGLAND.

THE report of the Board of Agriculture of 1904, which has just been issued, proves to be most satisfactory from many points of view.

Surrounded as we are by the sea, it is only necessary to stamp out contagious diseases and to impose regulations which will be sufficiently strict to ensure a thorough inspection of all live-stock admitted into the country. Quarantine regulations are a necessity in cases where live animals are admitted from countries where serious contagious diseases exist, and no better proof of their value could be brought forward than the statement which appears in connection with rabies on page 12 of the Report, "that this disease has been entirely extinguished in Great Britain, no case having occurred during 1904. Not a single individual has died of hydrophobia. . . . There are good reasons for believing that this terrible disease will never appear again in this country, as the regulations which apply to the landing of dogs from abroad are of so strict a character that a comparatively small number are now imported, and those which are admitted are kept under veterinary supervision for a period not exceeding six months."

Of the contagious diseases of cattle, pleuro-pneumonia and foot-and-mouth disease can be considered extinct, whilst rinder-

pest is a disease which the younger generation of the profession who have not been out of England have never met with.

Some progress has been made, too, with swine-fever, as, although the distribution throughout England is still almost as wide as it was in 1894, the number of outbreaks has fallen very considerably, and this notwithstanding the fact that there are now about 700,000 more pigs kept in England than there were in 1904.

Anthrax and glanders are unfortunately on the increase, and, as both are communicable to man, they should, considering the danger, receive more special attention than up to now. With the former, cattle and pigs have been the animals principally affected, and the knowledge that there is great danger in cutting up an infected carcase cannot be too widely spread.

The Board of Agriculture have endeavoured, by means of leaflets distributed broadcast, to inculcate this fact in the minds of the agricultural community, and we as a profession have many opportunities of helping them in their efforts.

Glanders, under the present regulations, is rapidly on the increase, and since our editorial on the subject in last month's number another case of the death of a human being from this preventable disease has occurred, this being the second within a fortnight in almost the same district of London.

There is no doubt that it is quite the common practice of those who are unscrupulous, when they have had a case of glanders amongst their horses, to at once dispose of the in-contact animals, if not of the whole stud. By this means the purchasers of some of those horses are practically certain to introduce this contagious disease amongst their own. This ought to be made impossible, and the use of mallein on all in-contact animals at the discretion of the Inspector should be compulsory; a fair rate of compensation being accorded to the owner.

Taking them collectively, one might say that, compared with other countries, the contagious diseases of animals in England have nothing like the same terrors for stock-holders which they possess abroad

Eminent Members of the Profession.

Under this heading will be published from time to time a brief autobiography, with photograph, of members of the profession whose names have been associated with the advance of veterinary science in Great Britain, the Colonies, or on the Continent.

DUNCAN McNAB McEACHRAN.

F.R.C.V.S.LOND., D.V.S. MCGILL UNIVERSITY, MONTREAL, CANADA.

DUNCAN MCNAB MCEACHRAN, until very recently Dean of the Faculty of Comparative Medicine of McGill University, was born at Campbelltown, Argyllshire, Scotland, October 27th, 1841. After receiving a sound elementary education at the schools of his native place, at the age of seventeen he proceeded to Edinburgh to complete his education, and soon after entering the Veterinary College there commenced the study of veterinary surgery under the late Professor Dick. Shortly after completing his professional studies, in the autumn of 1862, he went to Canada, and for three years engaged, with marked success, in the practice of his profession at Woodstock, Ontario, at the same time proceeding to Toronto during part of the winter to give lectures on professional subjects. In 1866 he removed to Montreal, where he soon built up a large and lucrative practice. Through the influence of the late Major Campbell, President of the Board of Agriculture, and supported by Principal (later Sir William) Dawson, and the late Dr. G. W. Campbell, Dean of the Medical Faculty of McGill University, an arrangement was made whereby Professor McEachran was to deliver a course of lectures on veterinary science in connection with the regular medical course of the University. This may be said to have been the nucleus of the Montreal Veterinary College.

In 1875, to accommodate the increasing number of veterinary students, the Montreal Veterinary College was established by Dr. McEachran, and the college buildings on Union Avenue erected at the personal expense of the founder and principal. This college was long considered the very highest of its class in America, and ranked high among the veterinary colleges of the world. The Montreal Veterinary College made rapid progress, the thoroughness of its system of training and the high standing of its graduates attracting students from all parts of the United States, Canada, the West Indian Islands, Japan and Great Britain. In 1890 the college became more closely affiliated with McGill University, becoming the Faculty of Comparative Medicine, its principal, Dr. McEachran, taking the official position of Dean of the Faculty, which position he held till March, 1903, when he resigned from the staff of the University, having decided to devote his whole attention to his western stock-raising enterprise. It was by his advice that the Dominion Government created the present cattle and quarantine service, Dr. McEachran being appointed Chief Inspector for the Dominion, and placed in charge of the organisation of the service. After holding this position for twenty-six years, he resigned and became Hon. Veterinary Adviser to the Government; in March, 1905, he was elected Emeritus Professor of McGill University. The thoroughness of his work has since been abundantly tested. The export cattle-trade owes much to Dr. McEachran's skill and foresight, for in the early days of the trade he did much to direct it along the right channels and to secure the enforcement of the eminently sensible government regulations

which have done much to assure the steady advancement of the trade. He repeatedly represented Canada at scientific gatherings in Great Britain and Germany, the last being the Tuberculosis Congress held at London in 1891.

In 1875 Dr. McEachran was elected a Fellow of the Royal College of Veterinary Surgeons, being the only Canadian thus honoured. He was appointed a Justice of the Peace in 1886, and served in the Active Militia for ten years as veterinary surgeon of the 3rd (Montreal) Field Battery. He assisted materially in raising and organising the famous Strathcona Horse. Dr. McEachran was one of the original pioneers of the Alberta ranching industry. In 1881, four years in advance of the C.P.R. line, he visited Alberta in company with the late Senator M. H. Cochrane, of Compton. They proceeded *via* the Missouri river to Fort Benton, Mont., thence driving across the plains to the site of the present city of Calgary, at the junction of the Bow and Elbow rivers. He was Vice-President of the Cochrane Ranche Company till 1883, when he became General Manager of the Walrond Cattle Ranche Company, of which the late Sir John Walrond, Bart., was President, and this ranche is now the largest and one of the most successful ranches in Canada; Dr. McEachran is at present the President and General Manager.

Dr. McEachran married Esther, youngest daughter of the late Timothy Plaskett, Esq., of St. Croix, West Indies, and has had two children, Evelyn Victoria, who died May 24th, 1869, and Jennie Blackney now Mrs. H. B. Young, of Westmount, Montreal.

Dr. McEachran is a member of the St. James's Club, Montreal, the Forest and Stream Club, the Manitoba Club, Winnipeg, and MacLeod Club, Alberta.

He has lately presented to the Campbelltown Public Library his private collection of Kintyre books, believed to be the most complete extant; has affixed to the ancient Celtic cross, which is perhaps the most conspicuous object in the whole town, as it stands at the Campbelltown cross, two handsome bronze tablets, giving a copy of the Latin inscription, now somewhat defaced, on the memorial, and an English translation of the same, for the benefit of the many thousands of visitors whom the swift turbine steamers bring now to the ancient capital of Scotland.

Original Articles.

THE ANCESTRY OF THE HORSE.

BY E. G. HASKELL, ROYAL, VETERINARY COLLEGE, LONDON.

First Prize Essay of the Royal Veterinary College Veterinary Medical Association, Session 1904, 1905.

MR. CHAIRMAN AND GENTLEMEN,—In choosing the subject of "The Ancestry of the Horse" for my paper I have been influenced by the consideration that we ought to know something of the horse in health as well as in disease. That being so, I thought it might be interesting to investigate and trace the line of descent or ascent, which you will note the gradual evolution of, as Huxley well says, "a beautiful creature, one of the most beautiful of all land animals," and "an example of one of the most perfect pieces of machinery in the living world."

It is interesting to the student of evolution, and more especially if he be a veterinarian, to note that the evolution of the horse is better known than almost any group of mammalian animals with the exception of the camel tribe. I do not pretend that I am going to put before you a complete record of the horse's ancestry: that would be too big an order for the time at my disposal; I can at most but very lightly touch on those animals in the direct line of descent, with perhaps a mention of very near relations. Neither can I enter into the consideration of when the horse became a servant to man, though that would make a fascinating subject for investigation.

I am afraid, gentlemen, I shall now have to ask your patience while I as lightly as possible touch on a few anatomical details, which to most of you will be ancient history, but which are absolutely essential to our enquiry; everything which has not a direct bearing on the subject I have rejected.

In the first place, let us turn to the fore-limb. In most quadrupeds, as in ourselves, the forearm consists of distinct bones—the radius and ulna. The corresponding region in the horse consists of, at first sight, one bone, but, as you know, is really the partial fusion of the radius and ulna. I use the word "partial" because it is only at its lower extremity that the ulna is really attached to the radius by a bony union, and that only as a rule is complete when the animal is adult. It is also important to note that the radius and ulna have distinct diarthrodial articulations at their upper parts, and therefore are in every sense distinct and separate bones. The ulna is well developed at its upper extremity, but as it descends it runs out into a slender shaft which may be traced some distance downwards upon the back of the radius, and then in most cases thins out and vanishes at about the lower third of that bone, but not infrequently in some asses and mules it can he distinctly made out as far as the inferior extremity of the bone; I have also seen it running the whole length of the radius in the horse. It is also interesting to note that in the very young foal, and still more easily seen in the fœtus, there is at the lower extremity of the radius a small piece of bone which is quite distinct from the main mass of bone, and which is really the lower extremity of the ulna; in later life as ossification is completed the line of demarcation is lost, and it becomes practically confused with the radius.

What is commonly called the "knee" of the horse is really its wrist and corresponds to that structure in ourselves, whilst the cannon bone, or large metacarpal bone, answers to the middle bone, the third, of the five metacarpal bones which form the bony part of our palm of the hand.

The "pastern," "coronary" and "coffin bones" answer to the phalanges of our middle finger, while the hoof is simply a modified and enlarged nail. The second and fourth fingers of the human hand are represented in the metacarpal region of the horse by the small splint bones. (I may here perhaps remark that I am not comparing these regions of the horse and man because of any relationship between them, but purely for convenience sake; the metacarpal and digital regions of any other mammal would do almost equally well.)

These small splint bones are about two-thirds as long as the cannon bone, and gradually taper to their lower extremities and bear no finger joints or phalanges.

Professor Ewart has shown that a horse during the embryonic period of his life has (like the mesohippus, an ancestor of which more anon) three digits on each limb. The rudimentary (second and fourth) digits, which later will be known as splint bones, are best developed when the fœtus is about twenty-two weeks old (at which time it is about 14 inches long). The first joint of these digits, viz., that between the metacarpal and pastern bones, persists till after birth; the second joint, that between the pastern and coronary bones, is the first to go; and the third joint, that between the coronary and pedal bones, is the next to disappear, which it does when the fœtus is about five months old. Although the digits of the splint bones gradually degenerate as the fœtus increases in size, they can still be identified at birth in the button or enlargement at the end of their respective splint bones.

Cases are on record in which one or both of the splint bones have been provided, like the cannon bone, with a more or less perfect pastern and hoof. In fact, there have been well authenticated cases of horses which were so completely furnished in this respect that they were shod on three hoofs of each fore foot; the supplementary shoes were only applied for exhibition purposes, as the additional digits were functionless. Apparently, these abnormal digits are not cases of monstrosities, but should be referred to as instances of atavism or reversion to a former type; if, however, as sometimes happens, there are two digits to a single cannon bone, the abnormality is one of dichotomy and not of reversion. Sometimes small bony or gristly nodules have been found at the bases of the two splint bones, and these in all probability represent rudiments of the first and fifth toes.

It has, therefore, been shown that that part of the horse's skeleton which corresponds to the human hand contains one large digit and at least two imperfect lateral digits, these answering respectively to the middle and second and fourth fingers in man.

Corresponding modifications are found in the hind limb. In ourselves and in most quadrupeds the bony skeleton of the leg between the knee and the tarsus or ankle, or what in the horse would be termed that part between the stifle and hock, consists of two bones, a large bone or tibia, and a smaller and more slender one, the fibula. In the horse, however, the fibula has apparently become reduced to its upper end and is a short, slender bone, united with the tibia at its head and tapering to a point below.

Examination of a young foal's tibia, however, shows a distinct portion of osseous matter, which is the lower end of the fibula, so that the apparently lower end of the tibia is really made up of the coalesced ends of the tibia and fibula, just as the apparently single lower end of the forearm is composed of the coalesced radius and ulna.

The heel of the horse is the part commonly known as the hock. The cannon corresponds to the middle metatarsal bone of the human foot, and the pastern, coronary and coffin bones to the middle-toe bones. As in the forelimb, there are merely two splints to represent the second and fourth toes. Sometimes a rudiment of a fifth toe appears to be traceable. What remarks have been made with reference to the metacarpal region will do equally well applied to the metatarsal. I have not, however, come across any case of atavism corresponding to those on record with respect to the forelimb.

I must not stop to refer very particularly to the teeth of the horse, though they have a very important bearing on the subject of his evolution. I should, however, like to draw your attention, more particularly in the case of the molars, to the fact of their extremely complicated structure. They differ very widely from the teeth of carnivorous animals in accordance with the use to which they are put, for instead of having to tear particles of food apart they have to grind them. The crown of the molars of the carnivora are simple in structure, composed of tubercles and entirely covered with enamel, while the tables of the molars of the horse are flat and the tooth is composed of a number of different substances of unequal hardness. The consequence of this is that their component parts, enamel, dentine and cement, wear away at different rates and hence the surface of each grinder is always as uneven as a good millstone (Huxley). The softer and harder parts are intimately interlaced, with the result that as the tooth wears it presents a very complicated pattern on its wearing surface. It may also be pointed out that the wearing surface of the lower molars is quite different from that of the upper. If, therefore, upper and lower corresponding molars be applied together it will be found that the harder portions are nowhere parallel, but frequently cross; thus in the act of mastication the hard surface of one tooth is constantly applied to the soft surface of the other and *vice versa*. They thus constitute a grinding apparatus of great efficiency and one which is repaired as fast as it wears, owing to the long continued growth of the teeth.

In the horse, too, another peculiarity is the diastema or interdental space between the corner incisor and first molar. In this space the adult male horse presents near the incisors on each side a canine tooth or tusk which is commonly absent in mares. In the young horse there is also frequently seen in front of the first molar a very small tooth or "wolf's tooth," as it is termed, which may soon fall out. This small tooth is said always to be present in the foetus.

Another unusual peculiarity in the teeth of the horse is the fact that the first molar is rather larger than those which follow it, while in most other mammals the teeth decrease in size from about the middle of the series backwards and forwards.

I have now briefly enumerated those characteristic structures of the horse which are of most importance for the purpose of tracing the pedigree of the *equidæ* to their remote ancestors. They show that the horse deviates very widely from the general mammalian plan and is, in fact, an extreme modification of it.

The least modified mammals have the ulna and radius, and fibula and tibia, separate and distinct. They have five separate and distinct digits, all pretty much of a length, on each foot. The general number of teeth is forty-four, while in horses the usual number is forty, and in the absence of the canines this may be reduced to thirty-six. The incisor teeth are devoid of the fold seen in those of the horse, and the grinders regulariy diminish in size from the middle of the series to its front end. Their crowns are short, early attain their full length and exhibit simple ridges and tubercles in place of the complex foldings of the horse's grinders. As we must regard the horse as a highly modified mammal, we conclude that he must have been descended from some creature possessing the general mammalian type of structure I have

described, and if this is so, as we progress backwards we should expect to find the limbs presenting a less equine appearance, viz., the separation of ulna and radius, and tibia and fibula, and the gradual appearance of other digits. We should also expect to find the teeth becoming less complicated in structure, possessing a shorter crown and becoming more numerous.

I propose, therefore, to as briefly as possible start from the horse of the present day and make mention of some of his fossil ancestors, pointing out as we progress the gradual approach to the general type of modified or ideal mammal. It must not be supposed for a moment that the chain of ancestry is absolutely complete, that is far from being the case, but it is complete enough to enable us to form an excellent picture of the gradual elimination of characters which past types possessed and which has resulted in the horse as we know him. The process of evolution is slow, so slow that when we estimate the probable length of time which has elapsed during which the changes to be described took place the imagination is appalled; our earliest type existed somewhere about 4,000,000 years ago, in the Lower Eocene period, roughly 2,000 times the length of the Christian era. It will be unfortunately necessary to burden you with some perhaps unfamiliar terms, but this is unavoidable if we are to study the subject in anything approaching completeness.

Fossil remains of horses have been found in Europe, Asia, South Africa and America, and it is to the western territories of South America that we are entirely indebted for a consecutive series of records of the fauna of the older half of the Tertiary period and to which we have no parallel in Europe. This is the more remarkable when we remember that when America was first discovered by Europeans there were no traces of the existence of the horse, and records of the conquest of Mexico dwell on the fact of the astonishment of the natives at their first sight of a man on horseback. As the horse was then entirely unknown, it follows that it must have been long extinct, disappearing long probably before the historic period.

Prehistoric Horses.—The horse of prehistoric times probably did not differ much structurally from the horse of the present day. It appears that these wild horses, the exact species of which is not well determined, but they probably resembled the ass and zebra, roamed in vast numbers over Europe and Asia during the older Stone Age, and were hunted and furnished food for paleolithic man, as the remains of fractured bones and flint instruments found together indicate. The earliest drawings of the horse depicted by the men of the reindeer age show him to have had an upright mane, scanty tail, no forelock, and some are shown with stripes.

Pleistocene Equidæ.—The direct line of ancestry in this period is somewhat obscure, but the name *Equus stenonis* has been given to a group of horse-like animals which flourished during the Pliocene and Pleistocene periods, the remains of which have been found in Algeria, France, Switzerland, Italy, and England. From their teeth it is probable that they were progenitors of the mountain zebra and quagga. There is no evidence, unfortunately, to show when these animals departed from the direct line of descent of the horse. This animal, with the contemporaneous *Equus sivalensis* of India, had a relatively larger head, somewhat smaller feet, the splint-bones were more

developed, and the skull shows traces of a gland cavity in front of the eye. This last character is peculiar and will bring to your minds the fact that the antelope possesses such a gland. At the present day there is no horse-like animal presenting this feature, and so the species must have become extinct,

We now have to consider a true ancestor of the horse, the *Pliohippus* fossil remains of which were found in the Pliocene formation of America. This animal was very equine in type, and had only one hoof to each leg, the second and fourth digits being in a vestigial condition under the skin. The splint-bones were a little longer than those of the horse, but did not come quite down to the fetlock joint. The incisor teeth showed cement in their infundibular, the canine teeth were small. The crown of the molar teeth was a little shorter than in the horse of the present day, and the table a little less complicated in design. From the above variations in structure, though they are slight, we see on what lines increased variation will probably run.

The next in descent of which we have record is the *Protohippus*, which lived in the lower Pliocene. This animal resembled the hipparion of Europe, to which I shall have to refer again. Protohippus seems to have been evolved in North America, from where it seems to have extended to South America and Asia, extending to the latter continent across the land which then joined Asia and America, where the Behring Straits now are. In this animal the skull resembled that of the horse of to-day, but the crowns of the molar teeth were shorter than those of the Pliohippus. In the limbs, however, we see very great differences. The ulna now extends the whole length of the radius, though it is still firmly attached to it. The fibula, however, has not yet attained that distinction with regard to the tibia. Finally, we have a point more interesting than any of the preceding, viz., that each of the splint-bones is furnished with a complete number of phalanges, but these do not obtain contact with the ground, any way at a moderate pace; it is probable, however, that at a rapid pace they did, when, owing to greater exertion, the fetlock-joint was brought nearer the surface of the earth.

Leaving the Pliocene period, we enter the Miocene, and now encounter the *Miohippus*, the remains of which are found in the upper Miocene of America. This animal was about the size of a donkey. The characters of the limbs are much the same as in the Protohippus, but in the fore-limb we find a very small vestige of a fifth digit in the shape of a small nodule of bone to which that member has now degenerated. The depressions in the molars are not now filled with cement and only the middle incisor is cupped. The crowns, too, of the molars are very small. At about this stage the European record of the horse stops with the *Anchitherium*, a horse-like animal not in the direct line of descent.

Next in backward order of time is the *Mesohippus*, found in the base of the Miocene. We notice here a still greater diminution in size, this animal being only about as big as a sheep. Two species are known, *M. Bairdii* and *M. intermedius*, of which the former is probably the older. In these animals the socket of the eye is open, behind which, we note, is another change, and approaches to the carnivora the gap between the canine and cheek teeth is comparatively short.

Now we find that the lateral digits are functional, and the fifth digit on the fore-limbs is no longer a mere osseous fragment, but has attained a considerable size, and reaches well down the metacarpal region. The canine teeth are now fairly large and the molars have short crowns devoid of cement in their depressions. The radius and ulna, and tibia and fibula, are distinct.

The *Epihippus* was a species little older than the preceding, but has no very distinguishing characters from it. We now leave the Miocene period and enter the Eocene, the earliest of the three divisions of the Tertiary period. The animal we now have to consider, while still bearing horse-like characters, differs very materially from existing horses: it was termed *Orohippus* (*Pachynolophus*) by Prof. Marsh, to whom we are indebted for most of the information on this subject.

Several specimens of this animal have been found, but none occur later than the Upper Eocene. There we find four complete toes on the front limb (you will remember that in the Mesohippus the fifth digit was represented by a splint bone), three toes on the hind limb, a well developed ulna separate from the radius, and a well developed fibula distinct from the tibia. The molar teeth are short-crowned and of simple pattern. Still more ancient is the *Protorohippus*, which was only about eighteen inches high. We are now approaching the end of our series with the *Eohippus or Hyracotherium*, which is the earliest direct ancestor of the present horse. It was found by Prof. Marsh in the Lower Eocene of New Mexico. In size it was not larger than a fox. The lateral digits are relatively as large as in the tapir, and like that animal, were quite functional. The bones of the feet are proportionately shorter than in the horse, and all three joints of each toe probably touched the ground. We note from this that, though the horse of the present day is digitigrade, his ancestors were plantigrade, or nearly so. The canine teeth were everted or bent outwards and well developed, the incisors separate and chisel-shaped, with sharp edges, the "mark" or infundibulum being quite absent, and the premolars quite different from the molars. The third premolar had three cusps and the molars six cusps. The orbit was incomplete, as in the dog, and the brain was fairly large relatively.

Further back than this it is not at present possible to trace the ancestry of the horse, but there is little doubt that the hyracotheriums is descended from a still earlier five-toed mammal with a simpler type of cheek teeth and much shorter foot-bones. This hypothetical animal doubtless walked on the whole sole of its foot (plantigrade progression) instead of the tips of the toes, and was probably nearly related to the creature known as *Phenacodus primacrus* (a cast of the skeleton of which is exhibited in the Gallery of Fossil Animals in the Natural History Museum at South Kensington). This creature is certainly one of the most remote ungulate ancestors of the horse, and was antecedent to all the horse series, the hog, the rhinoceros, and all the other species of hoofed animals; was, in fact, the root from which all these different branches of the ungulate tree sprung. Phenacodus belonged to the early Eocene period, and an examination of the cast shows it to have possessed five digits on each limb and three phalanges on *each* digit, which is a more complete arrangement of the hands and feet than is possessed by any normal living animal. In our own case the thumb and big toe have only two phalanges, and two of the three

phalanges of the little toe are sometimes united. The ulna and radius were entire and separated, as were also the tibia and fibula. Phenacodus had also a typical set of teeth, *i.e.*, twenty-two in each jaw, forty-four in all. The incisors were small, and had sharp edges, and the canines were well developed in both sexes. There was no interdental space between the canines and premolars, and these premolars differed from the molars in being smaller and simpler in form. The crowns of the molars were short, and each carried six cusps. The head was small and carried nearly in a line with the neck; the brain also was small. Remains of Phenacodus have been found in Switzerland and America. In height he was about 21 inches. He is seen to have a very long tail and powerful hind quarters, and was a very active animal. In diet he was probably omnivorous, and inhabited low-lying marshy ground and forests. An inspection of the feet will show that the third toe was larger and thicker than the others; this one, you will remember, is the one that has persisted in the horse. Progression was carried out on the second, third and fourth toes, which were each provided with small hoofs.

We have now, gentlemen, traced the ancestry of the horse back to very remote ages, and we have found that each successive step has offered some deviation in character from the one following, and though the differences between succeeding species have not been very great, we find that when we compare the creatures at either end of our series, viz., Phenacodus and *Equus caballus*, or the horse of the present day, the difference in structure is very great indeed.

I have elsewhere mentioned a group of horse-like animals not in the direct line of descent of the horse. Undoubtedly they had common origin with him in Phenacodus, but as the ages rolled on they acquired certain characters which, though their general shape was very horse-like in appearance, distinguish them from the true horse. I must not do more than just allude to this branch of Ungulates, but such a one was *Onohippidium munizi*, the remains of which were found in the superficial deposits of South America. This specialised form has a skull characterised by the great length of the nasal cleft and the large size of the gland cavity under the orbit; the feet were probably single-toed. In the present-day horse from India there is a vestige of gland cavity above the zygoma, but the nasal cleft is of usual length. The *Hipparion gracile* is found in the Pliocene tertiary of Attica. This animal was also very horse-like, and stood about 14 hands high. It was three-toed like its horse relations of the period in which it flourished, but only used the central one for progression. It differed, however, from the horse in having a well-marked fossa in front of each eye, in which was lodged a tear or scent gland, similar to that found now a-days in several kinds of deer and antelopes. This animal has apparently left no descendants.

Before closing my paper I should, just for a moment, like to draw your attention to the "ergot" at the back of the horse's fetlock. This structure is thought to correspond to the large central foot-pad of the tapir, which, as you know, is a relation of the horse. If one regards it as a rudiment which has persisted, one naturally wonders when it was functional. I think there can be little doubt that the semi-plantigrade ancestors of the horse, as the Eohippus and those unknown forms which connected Eohippus with Phenacodus, must have had

footpads similar to those possessed by the tapir of the present day. Most people agree as to what the ergot represents, but there is a good deal of difference in opinion as to the chestnuts or callosities found on the limbs of the Equidae. By some these are regarded as representing foot-glands as found in some other ungulates, as some antelopes, and others regard them as vestiges of foot-pads.

I have previously called your attention to the fact that occasionally an animal is born with supplementary digits or other characters possessed by remote ancestors. I also said that we must not regard these cases as monstrosities, but rather as illustrations of atavism or reversion to a former type. At the present time there is a very interesting specimen exhibited at the Natural History at South Kensington. It consists of the left and right fore feet of a shire-horse foal. The left foot is an instance of reversion to a type obtaining in the extinct three-toed horse of the genus Hipparion. The fourth metacarpal or external splint-bone possesses one digit, as does also the internal splint-bone. The os pedis is much deformed, the outer side having been flattened off as if to make room for the fourth digit. The rudimentary toes are very short, being about 1½ inches long all over.

In the right foot the second metacarpus or internal splint-bone is very highly developed and shows two sesamoid bones at the back, but possesses only one phalanx. The phalanges of the principal metacarpus are very small and compressed looking. The fourth metacarpus, external splint, bore one phalanx. The extremity of the fourth digit bore a horny covering which projected from the skin and was quite salient. The hoof was abnormal, and divided into three complete divisions.

In preparing this paper I have come across a good deal of information which confirmed the opinion I had very early formed that the subject was a very large one. I have, therefore, been at some difficulty in deciding what to reject and what to retain in my anxiety to keep this paper within reasonable bounds and not to trespass too much on your time and patience. I am quite aware, therefore, that this essay must possess many deficiences, but still I have endeavoured to include as much information bearing on the subject as the time at my disposal permits me to inflict on you. It is, therefore, probable that in the discussion which will follow questions will be raised resulting in information from paleontologists present which, I hope, will be to our mutual benefit.

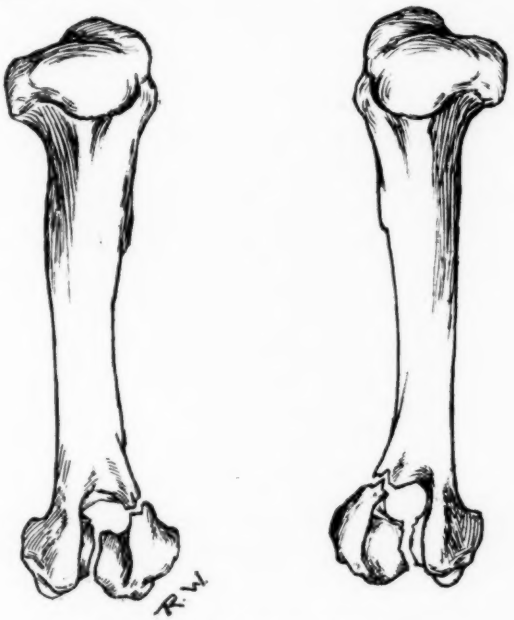
A CURIOUSLY SYMMETRICAL FRACTURE OF EACH HUMERUS IN A DOG.

BY PERCIVAL SNAITH, M.R.C.V.S., BISHOP AUCKLAND.

THE patient, a somewhat fat, heavy spaniel, about four or five years old, was brought to me because it appeared to have been seriously injured in the fore legs. The animal could not walk, although when forced to rise it endeavoured to do so and staggered about. The only history obtainable was that it was supposed to have been dropped suddenly over a fence. It fell heavily at the time and could not rise.

A fracture of each humerus could be readily felt, and, as the dog appeared in considerable pain, a dose of poison was administered.

Examination of the bones afterwards revealed the condition depicted in the sketch, which was kindly made for the JOURNAL by Mr. R. Waud.



Symmetrical fracture of the lower end of each humerus.

WARBLES IN THE HORSE.

BY TYLNY HAIGH, M.R.C.V.S., LIEUTENANT, ARMY VETERINARY DEPARTMENT.

IN my experience warbles in the horse is not at all common, and I had only seen one case, but since coming to Colchester I have had about forty in less than a month, the first occurring about the middle of March and the last on April 12th; most of the patients were remounts that had arrived from Ireland or Yorkshire last November. The warbles appear on the neck, withers, and back as lumps that come up in a few hours, and they usually make their appearance in the night. On clipping off the hair a small round hole can be seen, and usually the larvæ can be pressed out, but in some few cases the opening had to be enlarged with the knife. I have found more than one larva in each tumour, and usually when pressed out and the cavity treated with some disinfectant it healed up rapidly, but in some few cases abscesses of considerable size formed and gave a certain amount of trouble.

The fly *Hypoderma equi* is described in "Neumann's Parasites," also by Joiset (*Note sur l'Œstra cuticole de cheval, Mem. de la Soc. Vétérinaire du Calvados et de la Manche*, 1844), and in some text-books as H. Loisetri. The larvæ were not curled up, but went right down into the skin at right angles. Neumann describes them as being much smaller than in the ox, only 9 to 10 mm. in length, but some I found were 1¼ in. long by ½ in. in diameter.

AN INTERESTING CASE OF COLIC.

BY MESSRS. PAYNE AND SON, M.R.C.V.S., WEYBRIDGE.

On November 27th last we received an urgent message to attend a cart mare suffering from colic. Upon arrival we found the animal in violent pain, sweating profusely, the respiration much disturbed, temperature 104°, and the visible mucous membranes greatly injected. We administered mixtures of ether and chloroform at intervals, and attended to the patient's general comfort. On the following day there was still pain now and again, but this had passed off by the 29th. On December 3rd her temperature rose to 106°, although she seemed to be fairly easy. We now began the administration of febrifuges, but the temperature fluctuated between 103° and 105°, and the respirations were still a little disturbed until the 7th. During her convalescence she showed symptoms of excessive weakness, and it was not till the end of the month that she was fit to leave the stable. On April 7th we received an urgent message to say that the mare had had another very violent attack of pain, just after finishing her day's work. When we arrived we found all the symptoms of an internal rupture, and death took place about six hours later. *Post-mortem* examination revealed a rupture of the colon, whilst in close proximity to it was an enormously enlarged mesenteric gland about the size of a man's head. As this enlarged gland must have been present for some considerable time, it is possible that it had something to do with the previous attack of colic.

ABSCESS IN THE PHARYNX OF A YEARLING BEAST.

BY G. WATKINS, M.R.C.V.S., MAREHAM-LE-FEN, LINCOLNSHIRE.

On May 16th I was called in to see a yearling steer which the owner said was almost suffocated. When I arrived I found the animal breathing heavily and making a sound like a roaring horse after a hard gallop. The history was that the beast had been ailing for three weeks, the appetite being capricious and the roaring getting worse every day.

The owner had dressed it with a mixture of oil of tar and ammonia, and the exterior of the throat was very sore and showed evidence of the irritant. Having recently read of a similar case in the *Veterinary Record*, I examined the interior of the mouth and readily found a large swelling about the size of an orange at the back of the pharynx.

Pressing a gag in the mouth, I incised this swelling with a lancet to the extent of about an inch-and-a-half, and thus released a large quantity of thick inspissated pus which came down the nostrils and into the mouth.

The patient was immediately relieved, and I did not find it necessary to call again until ten days later, when the wound had healed and the bullock seemed all right.

POISONING BY TOBACCO IN THE HORSE.

BY G. WATKINS, M.R.C.V.S., MAREHAM-LE-FEN, LINCOLNSHIRE.

THE patient, an aged cab-horse, was brought into hospital one Sunday morning at about eleven o'clock, suffering from acute rigors. The breathing was much accelerated, and the poor beast was continually champing his jaws and salivating; the eye-balls were rolling about in a peculiar way in the sockets, and the animal tumbled over several times. Upon enquiring into the history I found that the owner had dressed it very thoroughly over the head and neck and both sides of the ribs, the quarters, and on the tail, with a quart of tobacco juice obtained from a neighbouring factory.

The remedy had been applied for mange, or, as the owner termed it, "the sweet itch." Diagnosing tobacco poisoning, we at once washed the whole surface of the skin with hot-water and soap, dried the animal carefully, put on plenty of warm clothing, and injected a full hypodermic dose of strychnine. About three o'clock the horse showed inclination for food, and, with the exception of great weakness, all the symptoms had subsided. The animal speedily recovered and was able to go to work three days later.

TWO CASES OF CANCER IN THE DOG.

BY J. P. ISHERWOOD, M.R.C.V.S., BLYTH, NOTTINGHAMSHIRE.

CASE 1. The patient, a brown retriever dog, aged about thirteen years, was brought to me on the 23rd of April by its owner, on account of a swelling on the left side of the throat in the region of the larynx. According to the history given, it had been in existence for about twelve months. As it appeared to fluctuate and to contain a fluid, I lanced it and dressed with a strong solution of iodine. The discharge was creamy, thin and very offensive. The growth itself did not appear to interfere with the appetite, although the dog was perceptibly losing flesh. I treated it for a few weeks until the wound had closed, but the growth itself, which was apparently attached to the larynx, and to some extent distinct from the portion I had lanced, still felt very hard and was about the size of a hen's egg. Thinking that possibly I had cancer to deal with, I persuaded the owner to allow me to forward the patient to the Cancer Research Laboratory in London, on the condition that it should be painlessly destroyed immediately upon arrival. This was done by the aid of chloroform, and Dr. Bashford, who examined

the growth, reported to me that it was a squamous-celled carcinoma. There were also other tumours of a like nature in the liver.

Case 2. About the beginning of January, 1903, I was requested to operate on an aged pointer bitch for a tumour of mammary gland. I removed it under chloroform, suturing the skin carefully and dressing the wound with chinosol lotion. The tumour weighed 2½lbs. and was almost cartilaginous in texture, I sent a specimen to Professor Mac Fadyean, who kindly informed me that it was a true case of scirrhous cancer. Meeting the owner two months later I was told that the wound had healed and there was no sign of recurrence of the growth. I heard no more from my client for about twelve months, when he informed me that the animal seemed to be wasting, and he also stated that she had considerable difficulty in passing her urine. I advised him to have her destroyed, as she was about eleven years of age and extremely emaciated.

Upon making a *post-mortem* examination I found three distinct tumours in the interior. One large growth was pressing on the neck of the bladder and intimately connected with the tissues of the uterus, and the other two were in the mesenteric glands and bowels. They were soft in structure and contained a kind of creamy fluid. Unfortunately they were not examined microscopically. Upon opening the thorax I found the lungs to be distinctly tuberculous. Some portions were in a state of caseous degeneration, whilst the pleura and diaphragm were dotted over with miliary tubercles. The liver and one kidney were also affected. Unfortunately I did not have these microscopically examined by an expert pathologist, but in my own opinion and that of a friend, a medical officer of health, there is no doubt that it was a case of general tuberculosis, and the question is, Which disease was the primary one? For my own part, I should say that the tuberculosis had existed for some time prior to the carcinoma of the mamma, and I have never before met with or heard of a case where the two diseases ran concurrently.

PECULIAR CRYPTORCHID TESTICLES.

BY J. R. U. DEWAR, F.R.C.V.S., PRINCIPAL, ROYAL (DICK) VETERINARY COLLEGE, EDINBURGH.

At the request of Prof. Hobday, I promised to send him a note with some details respecting several cryptorchid testicles he saw when here at the May examination.

No. 1, marked A, in Fig. 1, was brought to the College by Mr. Primmer, a student, and was obtained in the practice of Mr. Barclay, Dunfermline. It caused the death of a two-year-old Clydesdale colt through the spermatic cord becoming twisted round the bowel like the pedicle of a polypus; more than two days after its removal it weighed 10 lbs. 6 ozs. The spermatic cord was over 20 ins. long and may have been longer, as it was cut by the knacker's man before Mr. Barclay saw it. It consists of bone, cartilage, etc., and seems very conglomerate in its structure.* It would have been a most formidable object to remove in the living animal, and few would have desired to attempt it. Except one other of a similar nature, it is the largest I have seen.

* Microscopical examination by Mr. J. Bland-Sutton, F.R.C.S., has since demonstrated this to be a sarcoma.

No. 2, marked B (Figs. 1 and 2), shown, by way of contrast, in the same photograph, is at the opposite extreme. It is also from a two-year-old Clydesdale colt, and was removed on the 19th May in the practice of Mr. Harle, Coldstream. Although the upper part of the cord is spread out in the photograph, it is small and cord-like, with the nodule—it was little more—representing the testicle, quite distinct at its extremity. It just failed to turn the scale at half-an-ounce.

FIG. 1.—Testicles from cases 1 and 2.

FIG. 2.—Testicles from cases 3 and 2 (again).
A.—Vas Deferens. E.—Epididymis. T.—True Testis.

The actual size of these can be judged by the inch and metric measure shown in the photograph.

No. 3, marked A, in the second photograph (Fig. 2), was removed from a three-year-old Clydesdale colt, in the College yard, on May 20, and is peculiar in the loose disconnected arrangement of its component parts, so that they were somewhat difficult to identify. The small testicle (No. 2) is only shown in contrast.

No. 4 (Fig. 3) was removed from a two-year-old Clydesdale colt by Mr. Tait Forres, and was sent to the College last week by Mr. Rutherford, a student. A cyst—solid—can be seen below to the left, as looked at, of the testicle.

No. 5 (Fig. 4) was obtained in the practice of Mr. Reid, Auchtermuchty, and was removed from a three-year-old Clydesdale colt, on May 26, after operating the same day on two two-year-old Clydesdale colts with what might be termed normal cryptorchid testicles. It was removed after some trouble, and by using considerable traction in order to avoid enlarging the peritoneal wound more than was necessary. It was the only testicle found. A fruitless search for a

second testicle was made by the original incision on the left side and also by a fresh wound on the right. While no testicle could be found the end of the divided cord could always be got on the left side, and the end of a much smaller recently divided cord could also be got on the right side and even brought up through the right wound into view, showing distinctly that whether another testicle existed or not the one removed had attachments on both sides.

Although no measure is shown in this photograph, it may be

FIG. 3.—Testicle from case 4.
A.—Testicle. B.—Dermoid cyst.

FIG. 4.—Testicle from case 5.
A.—Cord. B.—Epididymis. C.—Globus major. D.—Globus minor. E.—Testis. F.—Dermoid cyst.

accepted as being practically on the same scale as the other. Certainly the epididymis is nearly double the length of that of No. 3.

In this specimen there is a testicle and dermoid cyst. Part of the cyst is densely hard, but in cutting into the softer part it was found to be breaking down, and a considerable quantity of a porridgy purulent fluid escaped, containing hair and tissue *débris*. So that had it been left the probability is that it would have ruptured and caused the animal's death.

For the photographs I am indebted to my colleague, Prof. Bradley, and Mr. Linton, a student.

All the colts submitted to operation recovered satisfactorily.

AN EXTRAORDINARILY HIGH TEMPERATURE.

BY T. FLETCHER PRIME, M R.C.V.S., NORWOOD, S.E.

EARLY in 1902, when on a voyage with 820 horses from Fïume to the Cape, I was called one evening (when about 4° north of the equator and the whole ship was like an oven) to a Russian cob standing on the lower deck near the engine room.

The animal was standing with all four legs astride, there being great difficulty of breathing and the pulse almost imperceptible.

On taking the animal's temperature to my surprise I found the mercury had risen to the top of the thermometer past 110° F. Thinking something must be wrong with the instrument, I obtained another, but with the same result. Death occurred five minutes later.

Very high temperatures are, I believe, common in fatal cases of heat apoplexy, especially in the tropics. On a former voyage, with a greater number of animals, from New Orleans to Beira, I had no temperature taken higher than 106° F.

A GREEDY COW.

BY JNO. B. YOUNG, F.R.C.V.S., BRAINTREE.

JUST recently I received an urgent message to attend a cow supposed to be suffering from milk fever. At once it was quite evident that something extraordinary was the matter, as the whole place reeked with a most offensive, sickly odour, something like a soap factory. The milk-fever theory was at once disposed of, for she had three months to go before calving, and was not yet dry; the owner had been led to think it was this cause as she was quite unable to rise and in a semi-comatose condition; other symptoms were cold shivering fits, pulse almost imperceptible, temperature 102°, and acute diarrhœa at frequent intervals followed by straining. The fæces were about the consistency of melted butter and tinged with green.

Diagnosis. Some kind of poisoning.

Prognosis. Doubtful. After giving her stimulants, etc., getting her into a more comfortable position, and applying friction to the extremities, I proceeded to investigate the cause. This seemed obscure until one of the cowmen suggested cart grease, saying he had seen her about the cart shed the day before, near where the knackerman had placed a full keg of horse fat. We found foot marks in the mud around it and a large quantity had disappeared; what remained was put on the scale and weighed 16lb., the empty keg being 4lb. The quantity originally supplied was 32lb., and it is always sent in quite full weight, so that the capricious animal had devoured at one meal at least 12lb. of horse fat. The hot weather had rendered it semi-fluid, and this doubtless helped her to swallow it quickly. For some days she remained in a critical condition, but eventually made a good recovery.

A CURIOUS CASE OF EMPHYSEMA.

BY CHARLES MORGAN, M.R.C.V.S., NONNINGTON, KENT.

On the 22nd of February I was called to attend a Jersey heifer two years old. I found the animal very tympanitic and almost *in extremis*. Not having been prepared for this condition, unfortunately I had not a trocar with me, so I punctured the rumen with a pocket knife. This gave temporary relief and, as the owner had given several doses of linseed oil shortly before, I did not administer any medicine. When I saw the animal on the day following there was not much improvement in her general condition, and I then administered a full dose of Epsom salts.

On the 24th, the heifer was again "blown" and the owner, copying my example, had a short time before passed his knife blade through the original punctures. I used the trocar and left some stimulating medicine. I did not see the patient again until the 28th, when she looked very depressed and was still slightly tympanitic. I noticed a curious tumefied appearance of the near shoulder. During the next two days this emphysematous condition extended, until by the 1st of March the whole of the near side of the shoulder, back, loins and hips was affected. The animal was still very much distressed, and on the 3rd, as she had completely lost her appetite, I advised the owner to have her destroyed.

Remarks. I thought perhaps this case might be of interest to some of the readers of the Journal, as I had never seen anything like it as a sequel to puncturing the rumen, and even now I don't understand how the gas could have found its way up to the shoulder at the commencement in the manner it did.

NOTES ON A CASE OF TUMOUR OF THE BRAIN IN THE HORSE.

BY CAPTAIN F. W. WILSON, M.R.C.V.S., A.V.D., EDINBURGH.

The patient, which was a troop-horse, aged six years, with no previous illness, first came under observation in October, 1904; the report being to the effect that it would occasionally collapse and fall suddenly, for no accountable reason, both on mounted duty and when led out of the stable to water.

No injury to the cranium or temporal bones could be found nor was the hearing impaired, the pupils were of normal size, and their function unimpared.

The patient being in poor condition, and considered to have become run down, it was sent out for a rest in a straw yard from November, 1904 to January, 1905; it came back looking better and was sent to work.

The symptoms observed between February and April, 1905, were as follows: the action of the limbs at the walk and trot were natural, excepting excessive extension of the hind limbs, and when sharply turned a loss of rythmical locomotor control of the hind limbs was

noticeable; these movements were clumsily performed and in a jerky, indecisive manner, and retrogression was not willingly nor properly accomplished. The combination of these indicated loss of locomotor control and conveyed the impression of being due to something beyond general clumsiness. During rest the commonest attitude was that of resting the chin on the manger, shutting the eyes, and emitting an occasional yawn; the near fore leg was placed in a state of extension, and the off hind in extension and slight abduction; the neck would become abnormally concave (taking into consideration the fact that the patient was slightly ewe-necked) along its superior border, no doubt accentuated by the head receiving support from the manger. These combined to illustrate a most unnatural posture, and after remaining like this for about five minutes it would wake up or perhaps fall down, rising in an awkward manner or requiring assistance to do so. It did not usually lie down at night and on one occasion became cast; it fell down once in the stable after being trotted out for inspection. The internal temperature was normal throughout, the appetite excellent, and the condition remained good; opthalmoscopic examination was made from time to time, and revealed no abormal state of the eyes.

The treatment firstly adopted consisted of extra diet, iron and cod-liver oil, and molassine, but on the development of symptoms indicating a cerebro-spinal affection a course of potassium iodide was adopted.

The patient, being considered incurable, was destroyed in April, 1905.

The *post-mortem* showed on examination of the brain a tumour on either side of the inferior surface of the cerebellum, the central part of the growth having become flattened between it and the superior surface of the medulla oblongata; the growths were soft, red, conglomerate, and of the external appearance of a mulberry, each being of the superficial area of a shilling, and covered by a clot of lymph and surrounded by a red network of thickened pia mater enclosing punctiform hæmorrhages and one clot of the size of a pea. The meninges for an inch from the perimeter of either tumour were in a condition of localised hyperæmia, the cerebro-spinal fluid was not excessive in quantity though tinged faintly with blood; no pus nor floating lymph could be seen. Unfortunately a microscopical examination of the tumour was prevented by its unauthorised destruction.

OCCURRENCE OF *ASCARIS MYSTAX* IN A LION.

BY R. G. LINTON.

FROM THE ANATOMY DEPARTMENT, ROYAL VETERINARY COLLEGE, EDINBURGH.

RECENTLY, during the *post-mortem* examination of a male lion, aged two years and five months, a large number of nematode worms were found inhabiting the small intestine. Although both stomach and large intestine were carefully examined, no parasites could be discovered in these parts of the alimentary canal. It was suspected that the nematodes might be *Acaris mystax*, but their comparatively small size

seemed to militate against such a supposition. Mr. A. E. Shipley, M.A., lecturer on Advanced Morphology of Invertebrates in the University of Cambridge, to whom some of the parasites were submitted, has concluded, however, that they are simply a small variety of the *Ascaris mystax* so frequently found in the domestic cat.

The occurrence is not without interest for several reasons. It is, in the first place, of moment, since comparatively little is known of the intestinal parasites of the large Felidæ. In the second place, it is noteworthy that the lion was young, and that the number of nematodes was great—some hundreds in all; Neuman (*Parasites and Parasitic Diseases of Domesticated Animals*, translated by Fleming, p. 470) stating that "the *Ascaris mystax* is more especially found in young cats," and that the number of worms is usually under ten. Furthermore, although their number was so great, none were present either in the stomach or in the large intestine, whereas in the cat the Ascaris is sometimes found in the stomach.

ABNORMAL DEVELOPMENT OF THE HORSE'S MANDIBLE.

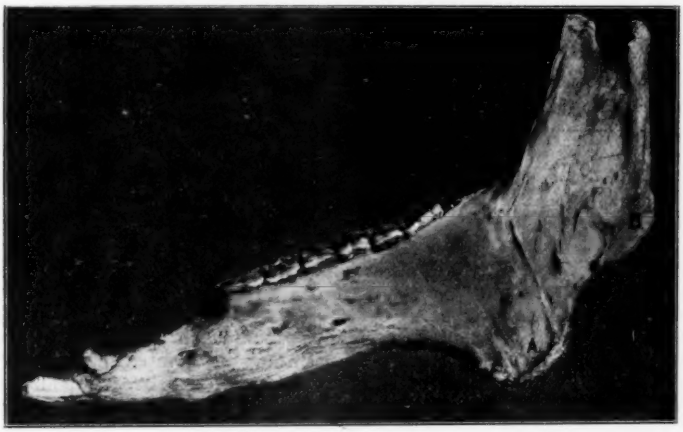
BY R. G. LINTON.

FROM THE ANATOMY DEPARTMENT, ROYAL VETERINARY COLLEGE, EDINBURGH.

A MANDIBLE which has recently come into the possession of this department has certain peculiarities which may be of interest. On a

comparison being made between it and normal bones of the same age and size the difference in form and development of the surfaces for muscular attachment was very striking. On the outer aspect of the

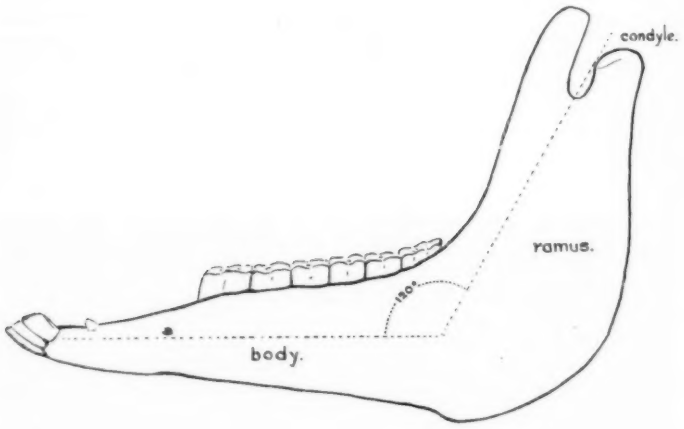
bone the general surface for the attachment of the M. masseter is not remarkable, but the posterior-inferior border of the mandible presents some strange abnormalities. As will be seen from the photograph, the contour of the outline is broken; that portion marked A in Figs. 1 and 2 shows an excessive and very irregular growth, the slight tendency that there is in the normal bone to curve outwards at this point being here very well marked. The combined increase of curvature and of growth in this region gave the animal a very peculiar appearance when alive. Immediately behind this projection the border, for a short space, is in no way unusual. There is some degree of roughness which might be expected in a normal mandible of corresponding age. But this comparatively normal region soon gives place to excessive growth (Figs. 1 and 2, B), possibly greater and decidedly more irregular than the one already



mentioned. This, like the preceding, is curved, but inwards instead of outwards, so that the concavity for the insertion of the internal pterygoid muscle on the inner aspect of the bone is greatly increased; besides which there are numerous irregularities, including a hook-shaped piece of bone which has its free end projecting forwards.

One of the most remarkable features of this mandible is the increase of the angle formed by the junction of the ramus and the body. To determine this angle the following procedure was adopted. The long axis of the body was taken as lying midway between the two borders of the bone. From the posterior end of this axis a straight line was projected to the anterior part of the condyle, this being taken as the axis of the ramus. Fig. 3 shows the method and the angle so obtained. In a normal mandible the angle was found to be 120°. In the abnormal specimen the angle was 135°.

The increase of angle is in no way associated with any unusual relation between length of body and length of the ramus. This was shown as follows. In a normal mandible the distance between the most anterior end and its condyle was measured. The length of the body—from its most anterior end to the posterior part of the last molar—was also measured. From the two measurements an index was



computed; the total length of the mandible being taken as 100. In normal specimens the index worked out as 64-65. In the abnormal mandible the index was 64.

Unfortunately, it was not possible to procure the right half of the bone, and so what might have been an interesting comparison was lost. But so far as can be gathered, the left half alone bore the above-mentioned peculiarities.

AN UNUSUAL PRESENTATION.

BY JOHN B. YOUNG, F.R.C.V.S., BRAINTREE.

SOME time ago I was called to a mare in labour, with all the limbs protruding as far as the knees and hocks, the head being turned back on to the hip.

The patient, a big Shire mare, was strong, in good condition, and a very favourable subject. The foal was a large one, and it was almost impossible to turn it about except by pulleys, or plenty of intelligent men. I first proceeded to fix the mare firmly to a corner of the barn by means of a strong halter, put on the usual way and tied so that it would give room if she fell down, then fixed the middle of a waggon rope upon the withers (over which I first placed a bag

half full of straw) and brought the ends of the rope through the fore-limbs and fastened at the same place as the halter. This was done so that, when the pulleys were put on, the head and withers would bear the strain equally. The most prominent fore-limb was then secured and pulled out as far as possible by the pulleys, the muscles beneath the chest cut and the shoulder slipped off; the other was treated in the same way, thus giving plenty of room to fix a crutch over the chest. Several assistants pressed against this, turning the foal over on to its back and rendering the removal of the remainder quite easy. This mare made a rapid recovery and took the horse again a few weeks after.

HEMISINE—A VERY USEFUL HÆMOSTATIC.

BY G. H. WOOLDRIDGE, M.R.C.V.S., PROFESSOR OF SURGERY, ROYAL VETERINARY COLLEGE OF IRELAND.

I HAVE given a fair trial to the above preparation, which is one of the supra-renal extracts, and have found it of very great assistance in controlling cutaneous capillary hæmorrhage from operation wounds. With its assistance one can perform almost bloodless operations, since with the absence of capillary hæmorrhage the larger vessels can be easily seen and picked up before cutting. It has no serviceable effect on vessels other than capillaries, and I fear that in many of the cases where results have not come up to expectation the alleged failure has been due either to too much having been expected from it, or to having been used too dilute. The strength I employ is 1-1000 in normal saline, injected subcutaneously, with 5 per cent. cocaine hydrochlor., or alone if a general anæsthetic be administered. I have used it chiefly for the excision of tumours in dogs and also for the external wound in performing ovaro-hysterectomy. I can record only one failure in the series, viz., in the case of a foxhound with a tumour on the sheath. It is scarcely fair to call this case a failure owing to the condition of the tumour. On making the first incision after injecting hemisine, the blood welled out as though from a saturated sponge. Numerous artery forceps failed to check the hæmorrhage, and a well-known surgeon from one of the Dublin hospitals who had come to see the operation agreed with me in diagnosing the case as one of unusual cavernous angioma. I checked the bleeding by passing a double ligature through the very diffuse base and removed the anterior portion, which was about the size of an average russet apple. Further operation was postponed owing to the bleeding, but as microscopic examination proved the growth to be a vascular adeno-carcinoma, and further examination of the patient showed that the superficial lymphatic glands in the groin were most probably implicated (confirmed later on *post-mortem* examination), destruction was advised and adopted.

I have not observed any untoward after-effects that could be attributed to the use of hemisine. In the case of a bulldog with a cyst about the size of an orange, at the angle of the lower jaw two

large thin flaps of skin were left and a portion of each became necrosed near the line of incision, and so near the seat of injection of the hemisine. That, however, was probably due to the circulation of the part being cut off and not from the use of the styptic, since no similar results occurred in other cases where the flaps remaining were of reasonable dimensions. Laparotomy wounds healed by first intention, as in cases where hemisine was not employed.

I have not had such good results when I have used hemisine in conjunction with eucaine, and similar failures have occurred when I have used ready-made-up preparations of adrenalin and eucaine, neither drug being of much service, cocaine being required to anæsthetise the part. In the ready-made solutions I believe the chief cause of indifferent results is their over-dilution. Similarly the effects have not been so uniformly good when the agent has been applied after making the incision.

I strongly recommend its trial, in the strengths mentioned, hypodermically administered and always freshly prepared before each operation. The solution I advise for a dog consists of:—

Hemisine (Burroughs, Wellcome & Co.)	½ soloid.
Cocaine hydrochlor	2 grs.
Cooled boiled water	40 m. m.

Inject along the line of incision and allow three or four minutes before commencing to operate.

(One soloid contains 0·005 grammes of hemisine, and when dissolved in 5 c. c. [84 m. m.] of water yields a solution of 1-1000 in normal saline. B. W. & Co. directions).

FOREIGN BODY IN THE ŒSOPHAGUS OF A DOG.

BY JOHN BLAKEWAY, F.R.C.V.S., BIRMINGHAM.

The patient was a St. Bernard about seven months old and had swallowed a piece of stick on April 11th, 1887.

When brought to me on the 18th it was almost dead from exhaustion and very lame on the left foreleg; there was an enlargement in one of the intercostal spaces and also along the course of the œsophagus about half-way down the neck. The dog had eaten scarcely anything since swallowing the stick. An incision was made over the projecting end which could be readily felt and a round stick of about the size and shape of the end of a billiard cue (it proved to be a portion of a candle rod) twelve and a quarter inches long was removed. Two thread sutures were inserted in the œsophageal wound and the external skin stitched in the ordinary way. Beyond careful diet for a week on milk and raw eggs the patient required little attention and made a rapid and perfect recovery. About a month or so after the operation an abscess formed in the intercostal space, but with a little treatment that all disappeared.

OVARO-HYSTERECTOMY IN A BITCH.

JOHN BLAKEWAY, F.R.C.V.S., BIRMINGHAM.

THE patient, a pug bitch two and a half years old, was brought to me on May 10th, 1889, about five weeks after pregnancy had taken place, the sire being a mongrel dog about four times her size.

Under antiseptic precautions I performed laparotomy and removed the whole of the uterus, which contained four puppies, ligaturing the body with thread. The incision was made in the median line and was afterwards sewn up in the usual way. The animal made a rapid recovery and was discharged from hospital on the 16th. No anæsthetic or antiseptic of any kind was used and the little bitch went through the ordeal very well.

ERADICATION OF AFRICAN COAST FEVER.

FROM THE ANNUAL REPORT OF THE CHIEF VETERINARY SURGEON.

WHEN the unsatisfactory outcome of the experiments carried out in the Victoria District and in the Transvaal, for the purpose of testing the method of inoculation against African coast fever, recommended by Dr. Koch, compelled those Governments interested in the suppression of this disease to fall back upon their former policy of prohibiting, as far as possible, all movements of cattle, and of insisting upon the regular dipping or spraying of any cattle whose movement was unavoidable, the position in those Colonies in which the disease had become established became gloomy in the extreme. The ultimate hope of being able to suppress, or even to keep the disease within bounds, by such measures seemed small indeed, chiefly because scientists generally held that salted cattle, while apparently in the best of health, continued to perpetuate veldt infection indefinitely, and this circumstance appeared to offer a serious obstacle to the successful issue of any scheme for getting the upper hand of the disease, unless those animals known to have recovered from African coast fever were killed off, and all those subsequently developing the disease were summarily destroyed.

Lately, however, the additional light thrown upon the causation of the disease, and upon the life history of the brown tick (*Rhipicephalus appendiculatus*), now known to be the main factor in the dissemination of African coast fever, by the investigations of Messrs. Robertson, Lounsbury, Theiler and Stockman, suggests that it may yet be possible to stamp out the disease by the observance of certain precautions, which, although presenting considerable difficulties in an unfenced country like Rhodesia, in which there are a large number of cattle owned by natives, might be carried out with comparative ease in any Colony where fencing is the rule and not the exception. The Transvaal experiments conducted by Messrs. Theiler and Stockman do not bear out the view expressed by Dr. Koch, that animals which have recovered from the disease are capable of keeping up

veldt infection indefinitely, and seem to indicate that if all susceptible cattle can be kept off an infected pasture for a period of twelve or fifteen months, that it will become clean, even if recovered animals continue to graze upon it. Our experience in Rhodesia seems to show that when a severe outbreak of the disease occurs amongst transport oxen, and only a small percentage recover, if the recovered animals are kept rigidly isolated for about twelve months, after that period susceptible stock may be mixed with the survivors, and may be allowed to graze with impunity over the veldt upon which animals formerly died, the explanation being that the ticks which had dropped from the bodies of the sick animals while the disease prevailed, and which had acquired infective properties, have died out or have lost their pathogenic power by having attached themselves to unsusceptible animals, and that ticks dropping afterwards from recovered animals are incapable of transmitting the disease.

Susceptible cattle cannot, however, be introduced with safety into an area which has been swept by the disease if any breeding stock has been left upon it, unless dipping has been carried out so thoroughly that all ticks have subsequently been exterminated, because we find that the first generation of calves born of recovered animals appear to possess no marked degree of immunity, and if allowed to run upon an infected pasture, they generally contract the disease, die from it, and serve to perpetuate veldt infection indefinitely through the agency of infecting ticks, which detach themselves from their bodies.

This marked susceptibility of calves born of immune parents in Rhodesia has not been observed in German East Africa, but as I am told that the herds running on the infected area there are small in size, and do not show any marked tendency to increase, it is possible that there may be a certain amount of calf mortality which has hitherto escaped notice, and that this, coupled with the occasional introduction of susceptible cattle, may be the means of keeping the disease alive in that territory, and not the ticks dropped by the apparently healthy immune animals, as was formerly supposed to be the case.

One thing at least is certain, namely, that the hereditary transmission of immunity takes more than one generation for establishment, and, therefore, waiting for the evolution of a breed which will be immune to the disease is inadvisable, if the alternative of the eradication of the scourge is at all feasible. Now that the assumption that recovered cattle maintain veldt infection indefinitely does not seem to be well founded, the position becomes much more hopeful.

The following line of action, if an attempt is made to free an area from infection over which the disease has passed or in which a certain number of cattle have been left, offers a reasonable hope of success:—

First.—No susceptible stock should be introduced into such an area until at least twelve months have elapsed from the date of the last case amongst the original herd.

Second.—Any calves which may be born of immune parents should be isolated and kept by themselves in an enclosure to which the mothers may be allowed access, but from which the calves should not be liberated until the enclosure in which they are kept has been free from disease for twelve months, nor should they then be

allowed to run at large until the surrounding veldt has been clean for a year. At this stage, while the number of animals running on the infected area is small, systematic dipping may be profitably and economically carried out, all species of veldt-fed animals being subjected to this treatment in order to free the veldt from all ticks, whether disease-producing or not, and thus lessen the likelihood of the area becoming again infected.

If these precautions are observed there seems no reason to doubt that any infected area in which they are rigorously carried out will become clean in twelve or fifteen months at most.

Where native cattle are concerned, it will probably be found necessary to modify the procedure, as fenced-in enclosures for calves and dipping tanks will not be available. Under such circumstances the calves should be kept tied up and allowed a limited amount of grazing ground, and attempts at tick extermination should be restricted to an occasional spraying of the animals, if the native owners are inclined to look upon the operation favourably, but great care must always be exercised to avoid the adoption of any course likely to excite suspicion that the treatment is any way injurious, otherwise owners may take fright and cattle may be moved surreptitiously to other kraals to escape treatment, and a further extension of the disease may result.

While these measures will suffice to clean a district through which the disease has passed, the problem of checking its spread in a territory where fences are non-existent, where cattle are numerous and where most of them are in the hands of natives, is one which is much more difficult of solution. Under conditions like these, should an outbreak occur in a district crowded with cattle, the likelihood of being able to check it is not great. Rigid isolation under police supervision, and spraying the infected herd, particularly the affected animals, at short intervals with an approved insecticide, are practically all that can be done, but spraying in such a case must only be regarded as a means of diminishing veldt infection, not as a step which is likely to reduce the mortality, which it may rather appear to increase, because the lowering of vitality which spraying seems to induce will probably cause a rise in the death rate of so marked a character amongst animals sprayed while in the incubative stage of African coast fever, that the native mind will probably attribute the deaths directly to the treatment to which his animals are subjected, and not to the disease. For this reason it is often advisable in native districts to refrain from spraying and to have recourse to quarantine measures only. At the height of outbreaks of this description, no attempt should be made to put any dipping scheme into operation which necessitates the use of a central dipping tank, as any intermingling of herds in its vicinity will lead to a rapid diffusion of the disease throughout the district, because no dip can be depended upon to keep off ticks for any length of time, and animals may become infected at the dipping tank before being dipped by picking up ticks which have dropped off sick cattle belonging to other herds, or even while returning after being dipped. In spite of this drawback to the use of public dipping-tanks while the disease is rampant, compulsory and systematic dipping of transport cattle working along any road which circumstances demand shall be kept open should always be insisted upon,

as such a step destroys a certain number of infected ticks, retards to some extent the spread of veldt infection, and in time, if persisted in, tends to free the road of ticks, a result greatly to be desired, without taking into account the occasional disease-communicating properties possessed by these insects.

Outbreaks of African coast fever occurring amongst herds on the edge of a well-stocked district where there are facilities for effective isolation may be handled with better hope of limiting the spread of the disease. In such cases the visibly sick animals should either be destroyed or should be sprayed at as short intervals as possible, say every ten days, and allowed to remain on the pasture upon which they are running at the time the disease appeared, and with them any apparently healthy animals found amongst the herd with temperatures of over 103·8 should also be detained as suspects, while the remainder after being sprayed ought to be moved to clean veldt, and their temperatures taken daily for the next fortnight, all animals whose temperature rise above 103·8 being at once returned to the former grazing ground, the assumption being that, as the temperature rise precedes the appearance of the characteristic organisms in the blood, if animals are isolated before the organisms gain access to the circulation they will not have had time to contaminate any ticks which are attached to them. I understand that this line of action has been adopted in Natal, and in this way I believe a herd can be freed from disease without contaminating the same extent of pasture which would become infected if temperatures are not taken, and the cattle are moved to fresh grazing grounds every time the disease makes its appearance.

If the measures suggested herein could be carried into effect in a thorough manner with the hearty co-operation of the farming community, coupled with judicious handling of native cattle, the eradication of African coast fever appears to be within the bounds of possibility.—*Rhodesian Agricultural Journal.*

HEPATIC CIRRHOSIS IN SHEEP DUE TO RAGWORT (*SENECIO JACOBŒA*).

ABSTRACT FROM THE OFFICIAL REPORT ISSUED BY MR. J. A. GILRUTH, M.R.C.V.S., CHIEF VETERINARIAN, NEW ZEALAND DEPARTMENT OF AGRICULTURE

SINCE the publication of the last annual report, in which the subject of chronic inflammation of the liver in horses and cattle, due to the ingestion of *Senecio jacobœa* (ragwort) was exhaustively dealt with, I have been able to adduce facts which prove that sheep may also become affected with the disease, and, as in the case of horses and cattle, may be affected for a considerable time before any symptoms whatever are exhibited.

That sheep can resist the action of the Senecio poison to an indefinitely greater extent than cattle and horses there is no doubt. It is a matter of common knowledge that, whereas horses and cattle naturally display an aversion to the weed, and will under normal

conditions avoid its ingestion where possible, sheep, on the contrary, partake of it in almost any stage with apparent impunity. This has been proved by me experimentally. I have previously recorded the death of two calves after partaking of 108 lb. each of the weed cut and dried when in flower during a period of eighteen days, death occurring in ten and twelve days respectively after feeding with the weed ceased; the death of a steer, a cow, and one horse which had been pastured on land very badly affected with ragwort, the first steer in three months, the cow in four months, and the horse in four months; and the death of a horse which was fed at my laboratory for less than three months, during which it received 93 lb. of dried ragwort. All these cases (see last annual report) were proved to have been affected with cirrhosis of the liver in the various stages, and that this was due to the toxic principle of this weed there could be no doubt. During the period that the last horse was being fed at the laboratory two sheep received daily, added to their food-ration, ½ lb. of the same supply of dried ragwort as that given to the horse. At the end of six months these sheep were slaughtered, and a careful *post-mortem* examination made. The liver and other internal organs were found to be, to the naked eye, perfectly healthy, and a subsequent microscopical examination failed to disclose any abnormality whatever.

In addition to these experiments, we have had frequent opportunities of examining microscopically the livers of sheep which had been depastured for long periods on land where a large quantity of ragwort was in evidence, and have always failed to detect any marked pathological change. Notwithstanding the above, we have been able to demonstrate hepatic cirrhosis in sheep as a result of the toxic principle of ragwort, in spite of all the previous negative evidence.

In last annual report, it will be recollected, I dealt exhaustively with what assumed the proportions of an outbreak of the disease amongst a herd of breeding-cows in the Auckland Province, the origin being traced to a block of 4,000 acres of land very badly affected with the weed. Partly as a result of the large mortality, and partly owing to the definite proof afforded by our experiments as to the cause, the owners wisely ceased to depasture cattle on the affected land. The block of land in question being remote from the remainder of the property, the contour being rugged and the surface only partially cleared of timber, the possibility of eradicating the weed by tillage could not be considered. The only plan at all feasible was to attempt to eat it out by sheep. Accordingly the whole of the land was heavily stocked with sheep, and all seemed to go well for a time so far as the health of these animals was concerned, although the weed continued to spread. The same mob of sheep was not kept continually on the land in question, the method adopted being to keep two mobs, placing them alternately on the pasture for a period of six weeks at a time. For the first year no undue mortality was observed, although occasionally a complaint was made by butchers and others who had purchased fat sheep from the property that a number of the carcases were found after slaughter to be very yellow. During the past summer, however, a very considerable mortality occurred amongst the sheep utilised in the endeavour to keep down ragwort on the affected block. Even sheep which had been drafted

from the mob as fat, and apparently healthy and sent to market, succumbed *en route* to and at the slaughter-house pending slaughter.

Pathological Changes in Organs of Sheep.

Specimens from all these cases as detailed above were carefully examined under the microscope in the laboratory, the following being a general description of the morbid changes.

Compared with the cirrhosis in horses and cattle, the new fibrous tissue laid down in the liver is arranged much more loosely, and a much greater number of new connective-tissue cells can be observed. The capsule is not very definitely thickened, unless at certain irregular intervals; it is never markedly adherent, and can always be readily stripped. The new connective tissue is often found in isolated or apparently isolated areas, is frequently only interlobular, and apparently does not spread between and isolate the hepatic cells so generally as in the horse and the ox, although in one instance the growth of new fibrous tissue, both inter and intra-lobular, was as marked as the most advanced case in the horse or ox. Fatty degeneration of the hepatic cells is common, and occasionally this condition is also noted in the new connective tissue. Hæmorrhagic areas are occasionally found. The kidney is usually unaltered, but in the badly affected cases there is considerable congestion of the capillaries, with a catarrhal condition of the tubules. In one case nearly every malphigian body exhibited blood-extravasation into the space between Bowman's capsule and the glomerulus.

Conclusions regarding Sheep.

From experience gained and information collected, there seems to be no doubt that, provided ragwort is not present to such an extent as to absolutely monopolise the soil, sheep, except perhaps a very small percentage, may live and even partake of the weed daily without suffering any ill effects. Indeed, if the pasturage be not too thickly intermixed with the weed, the results of grazing by sheep will be a decided check upon its growth and spread, if not, as occasionally happens, its almost complete eradication. No doubt the cause of this is twofold. Naturally the stimulating effect of the ragwort toxic principle upon the sheep's liver is manifestly but slight in comparison with its effect upon the portal circulation of horses and cattle, and undoubtedly this forms their chief protection. But I am inclined to the opinion that another factor exists. A sheep, because of its method of prehension of food and its small mouth, can in any pasture pick and choose the herbage which it desires with much greater facility than can the horse or ox. Hence, given the same pasture affected with a fair amount of ragwort, it is easy to conceive that a sheep may leave the weed to one side when it feels so disposed, whereas the other animals could not do so, owing to the much larger quantity of herbage grasped at each effort of prehension. I have frequently observed that horses instinctively avoid the ragwort plant where possible, and yet from time to time they may be compelled to masticate some of the leaves, where a sheep, had it so desired, would have found no difficulty in evading them. This explanation, then, accounts satisfactorily for the flock of sheep mentioned becoming in time affected with the disease of the liver when depastured on

ground monoplised by the weed. That they take so long to develop any of the ill effects so readily produced in other animals is only because their system is naturally more resistant to the toxic principle of ragwort, not that they possess absolute immunity.

Four other pamphlets have also been sent to us on black-leg and abortion and sterility in cows, by Mr. J. A. Gilruth, and on some common ailments of foals, and the common diseases affecting the horse foal, by Mr. H. C. Wilkie, F.R.C.V.S. They are all published under the authority of the New Zealand Department of Agriculture, and are intended for the use of farmers and stock owners in places remote from any professional man. They are written in simple terms and no doubt answer their purpose fully and satisfactorily.

"TICK PARALYSIS AFFECTING SHEEP AND LAMBS."*

AN INQUIRY BY VETERINARY SURGEON BORTHWICK.

THIS "tick paralysis" is met with over a large area of the Colony, and has been recognised by the sheep farmers for many years, and unanimously attributed by them to a certain tick now identified by Mr. Lounsbury as the *Ixodus pilosus*.

As it was more than usually prevalent during last winter on several farms on the Fish River Rand, Mr. Borthwick was instructed to proceed to that district and conduct an enquiry into its nature and cause. The following is his report:—

"The farms on the Fish River Rand on which tick paralysis is more or less prevalent are Hopewell, Hartmans Kraal, Groenfontein, Thornkloof Rudsdal, Kagasomdt, Brakfontein, Olivefontein and Waterfall; it also occurs on one farm in the Somerset East district. There are probably a good many more farms on which the disease is prevalent, but I have not heard of them.

"*Time of Year.*—It is during the months of May, June and July, that the disease is most prevalent, some farmers stating that it only occurs every second year; but on the Somerset farm it has been appearing every year for the last three years.

"*Condition of Veld.*—It is seldom that cases are found when sheep are running on short veld, but in the kloofs when the veld is long and there is some bush, the disease becomes exceedingly prevalent.

"*Tick.*—The tick which is credited with producing the disease is the *Ixodus pilosus* (Lounsbury). The tick attaches itself principally on the inside of the thighs, behind the elbows and between the lower jaws. The ticks are also found on sheep which are not paralysed.

"*Symptoms.*—In grazing over the veld a sheep will be noticed to lag behind the others and then lie down, but on the approach of the herd it will get up and walk after the flock; it soon, however, lies down again, and seems to have more difficulty in getting up after each rest. Shortly afterwards the sheep will lie down, and on the herd's approach will not even attempt to get up, and shows no sign of fear or excitement; if lifted up it may walk a short distance with an unsteady gait,

* Abstract from the Report of the Chief Veterinary Surgeon to the Cape Government.

but soon falls down ; and if the lifting up is persisted in the sheep soon becomes unable to stand. From the time that the animal is first noticed to be infected until completely paralysed may only occupy six hours. After the sheep is completely paralysed it remains as if asleep for from twenty-four to forty-eight hours, when in the majority of cases it makes a rapid recovery. The temperature is normal.

"The above symptoms are those of a case which has been placed, while in the early stages of the disease, in a shed and left undisturbed. Very few die if so treated, but the deaths from the disease in the ordinary way are fairly heavy ; when the paralysed sheep is left out at night the ever watchful jackal usually plays the last act ; or the sheep, when still able to walk a little, may fall into a sluit and die.

"The number of ticks does not seem to influence the severity of the case, two ticks inducing as bad a case as fifteen ; but if the ticks are removed immediately the sheep is observed to be sick the recovery is more rapid, within twelve hours in many cases recovery is complete.

"The few *post-mortem* examinations which I was able to make did not show any noticeable change in the organs. Veterinary Surgeon Spreull made inoculations with the blood of affected sheep into healthy sheep, but the results were negative. (See Spreull's note attached.)

"To ascertain if dipping had any preventive action, I had a flock of eighty-eight grazed in a kloof when the disease was prevalent. Twenty out of the number were left undipped, the remainder being dipped in Cooper's Dip. The result was that within three weeks six out of the twenty became paralysed, three of which died, and not a single case occurred amongst the dipped sheep. On the same farm two flocks of 700 and 650 in which the disease was prevalent were also dipped, no cases occurring subsequently.

"On Hartmanskraal during the month of June, Mr. Innes had between sixty and seventy sick, but after dipping the cases ceased ; the lambs, however, after being kept in the kraal for a fortnight on being turned into the veld began to sicken, but were dipped with the same result.

"I had arranged to try the effect of dosing with Cooper's Dip, but that experiment fell through."

INOCULATION EXPERIMENTS.

Mr. Spreull took some blood from an affected sheep forwarded to him by Mr. Borthwick, and inoculated two healthy sheep. These sheep had already been rendered immune to malarial catarrhal fever. The inoculation failed to induce any febrile reaction or indication of constitutional disturbance.

A second inoculation was made with the blood obtained from a yearling hamel, which was brought to the station by Mr. Borthwick on his return. This hamel was in a somnolent condition on its arrival. The two sheep which were selected for this inoculation had not been used previously for any experiment, and each of them gave a distinct febrile reaction on the eighth day after inoculation. Blood smears were taken from one of these on the tenth day and microscopically examined, but no micro-organisms were found. These two sheep

were subsequently inoculated with blood from sheep affected with malarial catarrhal fever, and both became affected. (It would appear from these two inoculation tests that an attack of malarial catarrhal fever confers a certain amount of resistance to this tick paralysis, but that an inoculation with blood from a sheep suffering from tick paralysis gives no immunity to malarial catarrhal fever. But these experiments will require to be multiplied before any definite conclusions can be drawn.

Post-mortem Appearances.—The first case was a yearling merino ewe in poor condition; the heart-sac contained a little serous fluid, blood clotted fairly well in heart and large vessels, the lungs were congested, liver and kidneys a little congested, spleen normal, the small intestines inflamed throughout, stomach and large intestines healthy. The second case was a yearling hamel; all the organs appeared healthy, there was a slight amount of watery effusion in the heart-sac, and an increased amount of fluid in the spinal canal. The flesh looked soddened from prolonged lying, but was not jaundiced; the blood was bright red and clotted firmly.

Blood smears from both these affected sheep were examined by the microscope, but no micro-organisms were detected.

CONTRIBUTION TO THE STUDY OF EQUINE MALARIA.*

The following is communicated by Mr. Thomas Bowhill, F.R.C.V.S.

This disease is commonly known throughout South Africa as biliary fever. Dr. Hutcheon, the Chief Veterinary Surgeon for Cape Colony, states: "Individual cases occur all over the country, but it is most prevalent in the Cape Peninsula, and along the east coast to about 110 miles inland. It may occur at any season of the year, but most frequently during the summer and autumn months. It is fully as common amongst stable-fed horses as amongst those which are never inside a stable."

Theiler has recently described this disease as an equine malaria, owing to parasites in specimens he sent to Lavaran being classified by that authority as *Piroplasma equi*.

Edington, on the other hand, states: "I am strongly of opinion that a disease of horses in South Africa, commonly described as biliary fever, is in the majority of instances naturally acquired cases of malarial horse-sickness. I believe, however, a true biliary fever also exists." This statement is very inclusive.

According to Hutcheon, "Biliary fever has been described by veterinary surgeons in Natal as the biliary form of horse-sickness; but although it bears a strong resemblance to horse-sickness in some points, I am convinced it is distinct in its origin from that disease and amenable to different treatment."

* Abstract from the Report of the Chief Veterinary Surgeon and the Assistant Veterinary Surgeons of the Cape Government.

Hutcheon's conclusions are, as far as I am able to ascertain from the literature in my possession, accepted by all recent writers except Edington, who divides horse-sickness into two forms: (1) Virulent form with continued fever in which no parasites are visible; and (2) a non-virulent form with a malarial type of fever, and in which parasites are found.

Bruce, from the following statements, evidently considers the so-called visible parasites of accidental occurrence as far as their relation to the true horse-sickness is concerned. He states: "(1) The hypothetical germ of horse-sickness undoubtedly does pass through a porcelain filter. The experiment has been made by Dr. John MacFadyean, Principal of the Veterinary College in London, and by H. Watkins Pitchford and myself in Natal, amongst others. (2) The phase of the germ, which does not, according to Edington, pass through the filter, is, in my opinion, not the germ of horse-sickness at all, but a totally different and well-known parasite, the *Pyrosoma equi*, which Edington evidently accidently met with when working at horse-sickness, and thought to be a phase in the life history of the parasite of horse-sickness."

Equine Malaria.

Edington partially corroborates Bruce regarding the nature of the parasites present in his malarial type of horse-sickness, for in describing the various forms he states, "In Fig. 1 there are a group shown which are exceedingly like some of the forms of the parasite *Pyrosoma bigeminum* found in Texas fever."

These statements are further corroborated by Theiler, who says, "The *Piroplasma equi* is also represented by a similar variety of forms to that seen in redwater."

It is also important, in differentiating this disease from Edington's so-called biliary horse-sickness, to note that Theiler, when studying the sequelæ of equine malaria in a horse-sickness district, and where two cases of experimental horse-sickness and nine cases due to natural infection are included in his tabulated list, mentions no co-relation between equine malaria and horse-sickness, but describes the former as a distinct type of disease, thus qualifying Hutcheon's statement, "I am convinced it is distinct in its origin."

Regarding the transmission of equine malaria by inoculation, Theiler states, "I repeatedly injected horses subcutaneously and intravenously with the blood of equine malaria, which contained the piroplasma; but up to the present I have been unable to transmit the disease in this way from one animal to the other."

Theiler also tried to produce the disease by direct transmission from the jugular of a sick animal into a healthy horse for two minutes (about one litre of blood being the quantity stated to have passed); this procedure also failed to produce the disease. He considered the non-success of his experiments due to immunity, either acquired or natural, as all his experimental animals were South African veld horses. Edington, on the other hand, states, "The most remarkable factor in the investigations is the occurence of intra-corpuscular parasites in the blood of clean horses after the inoculation with the blood of the salted horses"—(*i.e.*, animals rendered insusceptible to the virulent disease). The same writer also claims to have regenerated a virulent

form of horse-sickness from a malarial form. It would be interesting to know with what class of animals Edington's experiments were made. If the salted animals referred to were South African veld horses it is quite possible that they may have been infested with *Piroplasma equi*, and supposing that the clean horses mentioned were imported stock, it is also possible that they may have contracted equine malaria from the inoculation with the blood of the salted horses. His report does not state whether the blood of the salted horses used in these experiments was examined for piroplasma previous to the inoculations; therefore it is also possible that the intra-corpuscular parasites described by him originated from tick infection. The evidence that ticks are the transmitters of this disease is not conclusive, but the analogy of this disease to similar diseases in cattle and dogs points to the tick as being the most probable origin of the malady.

Theiler states that: "The *Piroplasma equi* is not found in healthy horses or in horses suffering from other diseases." The above may account for what Bruce terms the evident accidental appearance of the *Pyrosoma equi* in horse-sickness, but it certainly does not explain how Edington was able to regenerate a virulent disease associated with hypothetical germs from a malarial type of disease associated with parasites easily detected, and the same parasites suddenly become invisible in the induced disease.

In this district over 100 cases of equine malaria have passed through my hands, the symptoms observed being in accord with those described by Theiler, except that I must differ with his statement that hæmoglobinuria does not occur in this disease. I have seen two well-marked cases, both of the animals eventually recovering. Edington also mentions the presence of hæmoglobinuria in one of the experimental animals. The majority of my cases were among imported horses, and, strange to say, during a period of eighteen months I have only seen two cases of genuine horse-sickness as compared with over 100 cases of equine malaria.

I prepared numerous blood films from the above-mentioned cases, and experienced no difficulty in demonstrating the presence of the *Piroplasma equi* when the examinations were made in the earlier stages of the disease.

The following is a description of the forms assumed by the parasites:—

(1) Large and small spherical forms, the latter about half the diameter of the former, the karyosomes being situated at the edge of the parasites in both forms.

(2) Large and small pyriform parasites, single and in pairs.

(3) Large and small stave-like bodies, some of them extending across the whole diameter of the corpuscle, sometimes in pairs; in one corpuscle I observed three lying parallel to each other, also one corpuscle containing four very small staves.

(4) The rosette form, consisting of four leaves connected in the centre by very fine threads, each leaf containing a karyosome.

(5) In one specimen, a distinct flagellate form, the body being pyroform and situated about the centre of the corpuscle, a long thin flagellum extending to the margin of the cell and terminating in a bulb a considerable distance from the cell. (Diameter of the infected cell, 3 m.; length of the parasite, 1 m.; length of the flagellum, 3·5 m.)

(6) In one case, where a great number of parasites were present, some citrate of potash was added to a small quantity of blood, which was kept at ordinary temperature. When the blood was examined on the next day the parasites were observed to be nearly all spherical or ovoid in shape, extra-corpuscular, and arranged in clusters somewhat like an agglutination, the karyosomes being stained a bright red.

Previous to the completion of this article I examined a sick horse at the Grahamstown Corporation stables which was working an hour before my arrival.

The animal exhibited the following symptoms :—Head depressed, copious frothy, yellow discharge from both nostrils, hurried breathing associated with heaving of the flanks ; temperature at 9 a.m., when first examined, 107·5° Fahr. ; at 10 a.m. it was 105·5° Fahr. The frothy discharge had increased and fell from the nostrils in large lumps ; ears cold, pulse fluttering ; the bulging over the eyelids described by Dr. Hutcheon being extremely well marked.

A little blood was taken from the ears, and films prepared and examed for *Anthrax bacilli* with negative results. Diagnosis : acute horse-sickness.

Films were also stained by the Romanowsky method for intra-corpuscular parasites, as the examination of the specimens specially stained for anthrax revealed some indistinctly stained intracorpuscular bodies. These bodies were easily identified as the *Piroplasma equi* by this staining method.

Mr. Malley, Assistant Government Entomologist, was also able to discern the presence of these parasites.

The horse died at 1.15 p.m., the *post-mortem* examination being made about an hour after death.

The following typical lesion of horse-sickness was observed :—Yellow gelatinous exudation into the pleural and pericardial regions, œdema of the lungs. The dark red or port-wine colour of the mucosa of the right half of the stomach described by MacFadyean was also well marked. The presence of the *Piroplasma equi* in the blood of this animal points to a double infection and may explain how Edington was able to infect clean horses with the blood of salted horses as mentioned above, and find parasites (" exceedingly like some of the parasite *Pyrosoma bigeminum* found in Texas fever").

It also corroborates the opinion expressed by Bruce, that Edington actually met with the *Pyrosoma equi* when working with horse-sickness.

The presence of the *Piroplasma equi* in the above-mentioned horse suffering from typical horse-sickness is certainly not in accordance with Theiler's statement (" that the *Piroplasma equi* is not found in horses suffering from other diseases").

From a *résumé* of the above-mentioned extracts from the reports and articles of those who have studied this disease, as well as from my own experience with the disease in this district, I am of opinion that Edington's so-called malarial form of horse-sickness is undoubtedly what is known throughout South Africa as ordinary biliary fever of the horse.

The peculiar comet-like disappearance from view of Edington's parasites in the virulent disease, and the reappearance with wizard-like regularity at certain periods in the non-virulent disease, is to my mind

a somewhat romantic cycle of development. His results will require to be controlled by other observers, as he is evidently dealing with some specific entity, capable only of causing "the virulent disease" under artificial conditions by some unknown and equally mysterious physiological idiosyncrasy, acquired (?) or prepared for the parasites.

Literature.

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THEILER. "Equine Malaria and its Sequelæ," *Journal of Comparative Pathology and Therapeutics*, June, 1903 (2), (8), (9), (10), (11), (14).
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BRUCE. *British Medical Journal*, October 11, 1902 (6).

Below our readers will find the continuation of a series of Articles from the pen of Lieut.-Colonel Nunn, on "Veterinary Toxicology." It is intended to publish these articles in book form at the conclusion of the series.

TOXICOLOGY.

HELLEBORE.

THE black hellebore, Christmas rose, or bear's foot, is grown as a garden plant in this country, and is indigenous in many parts of Europe; but there are other species, the white and the green, or American, the former being the most virulent. The whole of the plant is poisonous, but the rhizome and the rootlets are the most active, and this activity is increased when it is dried. The active principles are ill-defined, but the most virulent are helleborin and helleborein. Accidents usually take place from animals eating the plant when out at grass, but it is employed in a decoction for killing lice and parasites, and in places a portion of the rhizome is used as a seton in the dewlap of calves and may cause poisoning by absorption.

All the varieties of hellebore are depressants, lowering the action of the heart, and causing muscular weakness and vomiting; large doses give rise to unconsciousness and collapse.

Symptoms.—Applied to the skin it gives rise to redness and vesication, but this latter symptom is not well marked in animals. If applied to the mucous membrane or broken skin, its irritant effects are better marked, and absorption takes place, causing vomiting in the pig and dog.

Used as a seton it has a most energetic action, causing great swelling in about forty-eight hours, but with little suppuration, the swelling subsiding in from nineteen to twenty days. The surrounding connective tissue is mortified and sloughed off in a black mass the size of a hen's egg. If the swelling is scarified there is considerable hæmorrhage. The same symptoms are seen in sheep, but with horses and the carnivora this plan of setoning is dangerous.

Taken by the mouth, it causes vomiting and nausea with colicky pains and all the symptoms of gastro-enteritis. There may be diarrhœa, but not invariably, and if it is present at all it is always profuse, fœtid and frequently tinged with blood. There is always a great flow of saliva, and the animal is violently agitated and anxious. The respiratory movements are irregular, the pulse quick and small, especially if there is diarrhœa, there are muscular spasms especially affecting those of the abdomen and neck, with trembling of the tail and great prostration. The animal throws himself down on the ground, the mucous membranes become a leaden colour, and death takes place in about forty-eight hours from the commencement of the attack, the animal being usually in a comatose condition. Dragendorff has observed that veratrine is easily eliminated in the urine, which is voided in large quantities.

Post mortem.—There is a greater or lesser degree of inflammation and hæmorrhage into the stomach and intestines. Thierry has seen ulceration of the duodenum. There is engorgement of nearly all the parenchymatous organs and the heart, and the blood is black in colour and fluid.

Doses.—The poisonous dose is 60 to 90 grammes of the dried root for the horse, 4 to 12 goat and sheep, and 4 to 8 dog. According to Montemem, the dried root is four times more poisonous than the fresh plant. A case is recorded in the *Edinburgh Veterinary Review* for 1863, of a horse that ate about two ounces of powdered root, but recovered in about three hours.

Veratrine, the alkaloid, is a most virulent poison, and Kauffman gives the toxic doses both by the mouth and hypodermically as:—

	Hypodermic.	By the mouth.
Horse ...	0·40 grammes	1 to 3 grammes
Ox ...	0·25 ,,	1 to 3 ,,
Dog ...	0·02 ,,	0·05 to 0·25 ,,
Cat ...	0·005 ,,	0·005 ,,
Rabbit ...	0·005 ,,	0·03 ,,

The same author gives the toxic dose of the white hellebore as:—

Horse	150 grammes
Ox	180 ,,
Sheep	15 ,,
Dog	8 ,,

Treatment.—Consists of emetics, stimulants, such as acetate of ammonia, demulcents, morphia or opium, to relieve nausea and gastric irritation (Hugounenq), and infusions of tannin, which form insoluble compounds with the alkaloids.

Analysis.—The material may be reduced by Dragendorff's method and the alkaloid subjected to the following tests:—

1. Boiled with concentrated hydrochloric acid, veratrine at first gives a green colour, rapidly changing to red.
2. Sulphuric acid gives a deep red.
3. Mixed with sugar and damped with sulphuric acid, veratrine at first gives a yellow colour, changing to green and violet (Weppen's test).
4. With nitric acid a pale pink colour is given.
5. Bioxide of barium and cold sulphuric acid give a brick-red colour which when heated changes to violet.

M. Stourbe remarks that veratrine causes violent sneezing and that this simple physiological action is quite as valuable as any chemical tests.

Tobacco.

The tobacco plant (*Nicotiana tabacum*) belongs to the natural order *Solanaceæ*, and is a native of tropical America. The active principle is the alkaloid nicotine, a most powerful poison, which is found in all parts of the plant, but principally in the leaves, one or two drops of the tobacco juice from a pipe being enough to rapidly kill a rabbit if placed on the tongue. In the process of manufacture a considerable amount of the nicotine is got rid of, also the amount present greatly depends on the class of leaf and the nature of the land on which it is grown, the best flavoured leaf containing only two per cent., while in the rougher it is as high as six to seven per cent. (Schlossing).

Nicotine is a colourless oily liquid, with a smell characteristic of tobacco, which is increased by heating, it is soluble in water, oil, ether and alcohol, and on exposure to light turns a brown colour.

Accidents take place from the use of a decoction as a parasiticide, the nicotine being absorbed through the skin ; cattle also will eat tobacco readily. Both tobacco and nicotine are local irritants to the skin and the lining membrane of the intestines. The alkaloid is readily absorbed, its effects being seen half a minute after it has been taken. It undergoes *no* change in the body and can be detected in the natural secretions. According to Melsens, it preserves its properties for a long time after death, even resisting putrefaction. Fresh green tobacco leaves are harmless.

Physiology of tobacco poisoning.—Like strychnine, nicotine gives rise to tetanic spasms, rapidly followed by paralysis. It has a special action on the sensitive fibres of the pneumo-gastric nerve, causing derangement of the respiratory and circulatory systems. It also stimulates the motor nerves of the intestines, causing what is sometimes described as "intestinal tetanus." If the dose taken is very large, there is no preliminary excitement, death taking place almost at once from general paralysis. In burning, a number of compounds are formed, viz.: water, nicotine, ammonia, resinous and colouring matters, carbonic oxide (8 litres per 100 grammes of tobacco, Vohl and Eulenburgh), hydrocyanic acid and a small quantity of collidene, a highly poisonous compound which gives the characteristic perfume in high-class tobaccos, and which is in larger quantities in the Havana leaf than coarser sorts. Hugounenq also mentions another aromatic substance, pyridine.

Poisonous doses.—According to Kauffman the poisonous doses of dry tobacco and nicotine are by the mouth:—

	Tobacco.	Nicotine.
Horse ...	... 300 grammes	... 5 to 6 drops
Ox ...	... 500 ,,	
Sheep ...	... 30 to 60 ,,	
Dog ...	... 4 to 8 ,,	... 1 to 3 drops

Hypodermically :—

	Powdered Tobacco.	Nicotine.
Horse ...	... 30 grammes	
Ox ...	... 40 ,,	
Dog ...	... 0·80 ,,	... 1 to 2 drops

Poisonous effects were produced by Hertwig with half an ounce of powdered leaves in the horse; two ounces dissolved in water in two doses at two and a half hours' interval with the cow; and one to two ounces in goats; in these latter animals death taking place in about ten hours.

Orfila killed dogs in nine and a half hours, with five and a half drams of powdered tobacco given by the mouth, and in an hour with two and a half drams applied to a wound.

Symptoms.—Chronic poisoning, or "nicotinism," which is seen in man is not likely to take place in the domestic animals. In the acute form there is profuse salivation, loss of appetite, nausea and vomiting, tympanitis, violent colic, increased peristaltic action of the bowels and expulsion of fæces and flatus. The animal is restless and has an anxious look, spasms of different groups of muscles, and dyspnœa. The contractions of the heart are weak and irregular, intermittent pulse, sometimes weak, at others full and hard. The mucous membranes are at first red and injected, but afterwards become blanched, and there is polyuria. In many cases there is vertigo with coma. The eye is retracted in the socket, the pupil dilated and the membrana nictitans protruded.

In many cases death may take place at this stage from asphyxia, but in others from general paralysis, the patient sinking into a state of profound coma.

Treatment.—The unabsorbed tobacco must be got rid of in those cases where it has been absorbed through the skin, by washing; when taken into the stomach, by purgatives and emetics, or the stomach pump. Tannine renders nicotine insoluble, and stimulants are indicated, such as coffee, alcohol and the inhalation of ammonia to counteract the nausea and depression, with artificial respiration and hypodermic injections of strychnia to prevent death from asphyxia. The patient should be clothed and kept warm.

Post-mortem appearances.—When the tobacco has been taken into the stomach there is inflammation of it and intestines, with hæmorrhage into the cavity. The blood is black and does not coagulate, and in common with the other organs of the body gives off the characteristic smell of nicotine. Most of the organs of the body are congested and there is extravasation of blood into the meninges of the brain, kidneys, liver and lungs. There are patches of ecchymosis in the lungs and on the auriculo-ventricular valves, especially on the left side of the heart.

Analysis.—Vomited matter, the contents of the stomach, liver and blood, can be used for analysis, and either Stas's or Dragendorff's methods used to isolate the nicotine. The result will be an oily residue strongly smelling of tobacco, very irritant to the eyes and nose and with an alkaline reaction.

With strong sulphuric acid it gives a deep-red precipitate; with iodide of potassium it gives a brown precipitate that clears up after a certain time.

If a small quantity of the oily residue is dissolved in ether and treated with a solution of iodine in ether a brown precipitate is thrown down, which is transformed into ruby-red needle-shaped crystals, iodide of nicotine (Roussin's test).

Chloride of platinum with an aqueous solution gives an orange-yellow precipitate, corrosive sublimate a white, and arsenio-nitrate

of silver a yellow precipitate; ammonia gives similar reactions, but can be differentiated by the following tests: a solution of iodine gives a brown precipitate with nicotine, not with ammonia. Tannic acid gives a yellow-white precipitate with nicotine; with ammonia there is no precipitate, but a red colour. Chloriodide of potassium and mercury give a profuse precipitate even in a very dilute solution; gallic acid gives a pinkish-red colour changing to olive-green with ammonia; with nicotine there is no change.

Sulphuric acid and bichromate of potash give a green colour with nicotine, and, in addition to these tests, there is the characteristic smell and the physiological test, a drop placed on the tongue of a bird causing convulsions and rapid death.

Medico-legal.—It must be remembered that the reactions of nicotine are neither numerous nor very well defined, also that those of certain putrefactive products greatly resemble them, so before giving an opinion the clinical history of the case should be carefully considered.

The Solanaceæ and their Alkaloids.

The natural order of the Solanaceæ contains a large number of poisonous plants, the active principle of which depends on an alkaloid, and they are frequent causes of accidents in both herbivora and omnivora, more particularly cattle.

The active principle is an alkaloid, solanine. It is found in the form of white, silky crystals, that are but slightly soluble in water; when dry it has no smell, but wet that of potatoes; the taste is acrid, bitter and nauseous, and is found in several plants, particularly the night shades, "*Solanum dalcamara* and *Solanum nigrum*," and potatoes, especially in the stalks and buds, also in green potatoes that have sprouted in the dark. Solanine is removed by cooking, which explains the rarity of poisoning by it in man. Accidents amongst animals almost always take place from feeding on tops, or an excessive quantity of raw potatoes. It may also take place from eating the other plants mentioned.

It acts on the central nervous system, paralysing the respiratory and circulatory functions. It is not a very active poison, and, as the proportion is small, a large quantity of potatoes have to be eaten.

According to Cornevin, it is eliminated slowly, and if food that contains it is used for any length of time it accumulates in the system and accidents take place.

The lesions are not characteristic; the gastro-intestinal irritation that some authors have noticed is more likely due to mouldy potatoes than the solanine they contain; congestion of the large organs has been recorded, especially of the brain and its meninges.

Symptoms.—Cattle are dull and depressed, the appetite and rumination are suspended, and they go off milk. There is tympanitis with constipation, often followed by diarrhœa; the animal is usually down, in a drowsy condition and insensible to surrounding objects. The respirations become deep and slow, the heart-beats weak, pulse small and somewhat quickened, and sometimes there is a vesicular eruption on the skin. If the quantity taken is large the narcotism is well marked; death takes place quickly, often in a few hours, but in some cases the patient lasts for as much as three weeks. If the digestive organs are affected there is great loss of condition, the patient lying in a

state of marasmus. The same symptoms are seen in the goat and pig, but in the latter animal there is vomiting.

Treatment.—The antidotes are stimulants, especially coffee, also tannin.

Chemical Analysis.—As a rule the contents of the stomach are sufficient evidence as to the nature of the case, but the solanine can be isolated by Dragendorff's method, and will give the following reactions:—

(1) Treated with absolute alcohol and sulphuric acid, and heated over a water bath, it gives a clear red colour.

(2) With concentrated sulphuric acid and bichromate of potash, a blue colour, changing to green.

(3) A watery solution of iodine is darkened in colour. It should be remembered that their reactions are only obtained with absolutely pure solanine.

Translations and Extracts.

FOREIGN BODY IN PHARYNX OF A COW.

M. BERGEON, AMPLEPIUS, RHONE.

THE animal, a three-year-old cow, had had difficulty in feeding for three days with painful cough and swollen throat. There was salivation and difficulty in swallowing solid food, although she could drink fairly well and took a certain quantity of gruel.

A farrier was called in and prescribed, but suspecting the case to be one of foot-and-mouth disease, he sent for the author. It appears that the symptoms came on suddenly without warning; in the morning, the cow having been turned out to grass, and she was all right, but when brought up in the evening to be milked the head was down and stretched out, the mouth half opened and a quantity of saliva flowing from it, and she had been in the same condition ever since.

When seen by the author, in addition to these symptoms there was painful coughing, "the animal being nearly choked," with a loud roaring, noisy breathing. The membranes were injected, the pulse full and strong, the temperature 38·8° Cent., but no appearance of foot-and-mouth disease.

On examining the pharynx with the hand a thin sharp object projecting upwards and forwards was felt at the entrance of the œsophagus. An attempt was made to extract it, but this was impossible and violently resisted by the patient, who was with difficulty retained standing. It was then seized with a pair of pressure forceps and successfully removed. The object proved to be a piece of galvanized iron wire 2 in. long, slightly bent into the shape of a hook.

Relief was immediate, and the cow was fed on soft food for a few days and made a rapid recovery.

(*L'Echo Vétérinaire*, May, 1905.)

OSTEITIS AND INFECTIOUS OSTEO-MYELITIS IN THE HORSE.

EBERBACH.

THE disease is characterised by paralysis of the hind quarters, and may assume an acute, subacute, or chronic form.

The first greatly resembles hæmoglobinuria, but there is absence of any swelling of the muscles or discolouration of the urine. The patient usually remains standing up and paddles with his hind legs. There is no fever, and food placed in the mouth is not masticated, as there is inflammation of the maxillary bones. Fæces and urine are passed regularly and there is no diminution in the sensibility; indeed, there is considerable pain over the femoral region. The case usually ends fatally in about twenty-four hours, sometimes it lasts longer.

In the subacute form the animal remains standing for some little time and finally falls over and dies, and in the chronic the paralysis of the hind quarters gradually increases till the patient falls down.

The only constant *post-mortem* lesions are in the bones. There is effusion of blood, with softening and yellow exudation in the canals of the femurs, the cancellated tissue is redder and more friable than natural, and there are ecchymoses in the hard structure. The lesions are less well marked in the other long bones, but are seen in the dorsal vertebræ and lower jaw.

Dr. Schlegel, of Fribourg, has made a bacteriological examination of a diseased femur and isolated a micrococcus. Mice when inoculated became paralysed and changes were seen in the medulla of the bones of the hind limbs. It would appear that these cocci may become pathogenic under certain conditions. According to Eberbach, *bran disease* (*maladie du son*) cannot be attributed to absence of lime salts, as bran contains a considerable amount, and it is more probable that it is due to an infection. No doubt, infectious osteomyelitis is very closely allied to *maladie du son*, and both are caused by some infectious agent taken in with the food.

NOTE.—*Maladie du son* (*Krankheit*, German), which has been investigated by Anacker, is well known in Germany and Switzerland, and is most frequently seen in millers' horses that are largely fed on bran. The disease is characterised by swelling of the bones of the face and jaw (osteoporosis), the molar teeth becoming loose in their sockets.

Mittheilungen der Vereins bodische Thierarzte, April, 1904.

GENERAL OSTEOPOROSIS (DICEKERHOFF), OSTEO-MALACIA (FROHNER).

BY PROFESSOR HENTRICHE.

THE patient, a five-year-old horse, went off his feed and large painful exostoses appeared on the metatarsal bones and made him go lame. They then appeared on the fore limbs, especially round the coronets, which were hot and painful. There was difficulty in moving, and the lameness was greatest on the near hind. The exostoses grew larger and larger and the animal could scarcely move, till finally the limbs and

articulations had become double their natural size. There were also exostoses on the upper jaw, the ribs and scapula. The patient refused to eat and had great difficulty in standing.

Treatment consisted in feeding on crushed beans with phosphate and carbonate of lime, bicarbonate of potash and powdered gentian, but without success; arsenate of potash was also tried ineffectually.

Intertracheal injections of Lugol's solution, 5 grammes daily, increased to 6 grammes every other day, was tried with good results. This treatment had to be stopped on account of the swellings at the point of injection, and the case relapsed, to recover again when the injections were renewed. Altogether 500 grammes were given, slight iodism setting in after the 150th gramme.

The case was apparently cured in three-and-a-half months, the exostoses were only left on the metacarpal bones and there was no lameness. The animal was used for draught purposes, but, as there was a recurrence of the disease, he was destroyed.

PNEUMONIA IN THE HORSE.

BY M. V. DROUN, PARIS GENERAL CARRIAGE COMPANY.

CLOSELY allied to the undoubtedly contagious diseases that are officially recognised as such and legislated for in most civilised countries is a group of epizootics that are not so carefully provided for, but which nevertheless are a considerable factor in running up the death-rate.

In our climate the different types of pneumonia are the principal ones of this class, and the most dangerous. If in most cases the evolution is regular it generally ends in gangrene of the lungs or pleurisy. Indeed, sometimes in the middle of an epidemic the latter only is seen, but there can be no doubt but that it is due to the same causes, and the three forms, viz., pneumonia, pleuro-pneumonia, and acute pleurisy should be studied together.

The diseases appear to exist in an endemic form, subject to periodic outbreaks, or, in the words of the author, "spontaneous regeneration," and he supports his theory by certain statistics collected from amongst the horses of the Paris General Omnibus Company, between 1897 and 1903:—

Dates	Total Number of Deaths	Deaths from Pneumonia	Percentage of Deaths from Pneumonia	Percentage of Deaths from Pneumonia in total Number of Horses.
1897	756	292	38·4	2·38
1898	717	256	36·0	1·99
1899	798	353	44·2	2·89
1900	594	193	32·4	1·50
1901	205	49	16·6	0·43
1902	232	36	15·5	0·31
1903	216	40	18·5	0·36

It must be remembered that the majority of fatal cases are young animals recently purchased, and which are the most valuable. Also, as will be seen from the table, that during certain years pneumonia accounted for 30 to 40 per cent. of the total number of deaths.

In addition, the number of animals attacked, "which is five to one of deaths," must be considered, and the complications that may supervene on recovery.

In the table given below there is a striking decrease in the number of cases after 1901; possibly this is due to the adoption of a more rational system of treatment, but there are three other factors which must be taken into account.

As has already been stated, pneumonia is a disease of acclimatisation, and chiefly attacks young animals, in the majority of cases being a sequel to strangles. Previous to 1900, "the year of the exhibition," a large number of horses had been purchased by the company in anticipation of the increased work. These purchases were complete by the end of February, 1900, and after April pneumonia commenced to diminish, and as in 1901 very few new horses were bought, the rate still further decreased. The monthly losses for the three years, 1899, 1900, and 1901, are shown in the annexed table:—

Year.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total.
1899	53	75	58	50	30	11	4	9	11	7	22	23	353
1900	52	46	56	14	9	3	4	3	1	4	0	1	193
1901	5	3	1	7	8	4	5	4	1	4	2	5	49

Breed also has to be taken into account, some having a natural immunity, others being extremely susceptible to pneumonia. Amongst those bought in 1898-99 were a considerable number of Irish and American horses which were peculiarly sensitive, and in which the disease often ran on into the gangrenous form, the death-rate being high. Danish, Dutch, Swedish, and North-German horses are equally susceptible, also Percherons and Boulonnais. Normans and Bretons, although not quite so sensitive, provided a considerable number of fatalities, especially during the first months they were put to work, but, on the contrary, those from Central France, viz., Tarbes, and the Landais ponies, were almost refractory, and if they contracted the disease it was in a mild form.

Amongst foreign horses, Polish, Galician, and Hungarian were the most resistant, and it is to this "race immunity" that the decrease in the mortality since 1900 is attributed.

Up to 1880 only two forms of acute pneumonia were recognised:

(1) Fibrinous pneumonia with regular evolutions, usually unilateral, profuse nasal discharge, and a yellow tinge of the conjunctivæ being the premonitory symptoms. The sounds on auscultation are progressive and increase for about a week, when a crisis sets in, accompanied by a rapid fall in the temperature, absorption of the exudate, increase in the quantity of urine, and complete resolution, pleurisy and gangrene being rare. Cold appears to be the chief cause of this sort of pneumonia, to which the term "pneumonia a frigore" is given.

(2) Pneumonia from the presence of a foreign body, such as a

penetrating wound of the lung, or medicines passing into the bronchii, and which usually terminates in gangrene.

In 1880, Trasbot in France and Siedamgrotzky in Germany, drew attention to a form of pneumonia that was much more serious than the ordinary. It was seen in warm stables, also in hospitals, and chiefly affected aged subjects. It first attacked animals suffering from large suppurating wounds, and appeared to be contagious. It gave rise to extreme prostration, and auscultation showed pneumonic patches scattered all over the lung, gangrene and septic pleurisy often supervening, and microscopic examination showing peribronchitis and patches of hepatisation. The French observer designated it hospital, stable, or adynamic pneumonia.

For the past few years a new class of pneumonia has been attracting attention, viz., infectious pneumonia, which followed epidemics of typhoid fever in the horse, and which is in Germany known as "Brustseuche" by Dieckerrhoff, and in France contagious or infectious pneumonia or contagious pleuro-pneumonia.

The nomenclature, which is already sufficiently complicated, is rendered more so by the fact that a certain number of specific diseases have a marked predilection for the lungs, amongst which are typhoid fever and strangles, and it is impossible to overlook the fact that there is both strangles and typhoid pneumonia.

Weicheelbaum, Friedlander, Talamon and Frankel demonstrated in pulmonary hepatisation in man in 1886 a specific micro-organism, the pneumococcus, and at this time certain veterinary writers attributed equine pneumonia to this cause. This, however, is not the case, as pneumonia in the horse is quite different from that in man, not only in the clinical appearance, but the cause, and up to the present the pneumococcus has not yet been discovered.

Schutz, in 1887, threw some light on the subject (*Ursache der Brustseuche der Pferde, Arch. für Thierh.*, 1887). In the material obtained from animals suffering from "Brustseuche" he discovered an ærobic micro-organism, oval in shape, which in gelatine formed small round air bubbles without liquefying it. In broth it grew in chains, and was discoloured by Gram's stain. It was very virulent, killing mice in from twenty-four to forty-eight hours, and rabbits in from eight to fifteen days. Schutz appears to have found this organism in all the cases he examined, as he makes no allusion to pure pneumonia, which he certainly would have otherwise.

In 1888 Delamotte and Chantemessa (*Recueil sur l'hyg. et la méd. vét. mil.*, 1892, page 450) also discovered a streptococcus, which was fatal with the rabbit, killing by septicæmia. It stained with Weigert's method, and grew well in broth in chains, did not liquefy gelatine, and developed as well in air as in a vacuum.

In 1889 Galtier and Violet studied a form of typhoid which they termed forage pneumo-enteritis, but which, no doubt, is infectious pneumonia, demonstrating two virulent agents that are always associated together, one a small ovoid organism usually united in pairs (*Diplococcus pneumo-enteritis equi*), the other a long chain of micrococcii (*Streptococcus pneumo-enteritis equi*). These they found in the forage, and considered them as being the cause of the infection. The diplococcus, however, is no doubt the organism already described under the term of diplobacteria, and the streptococcus presents all the characteristics of the strangles organism.

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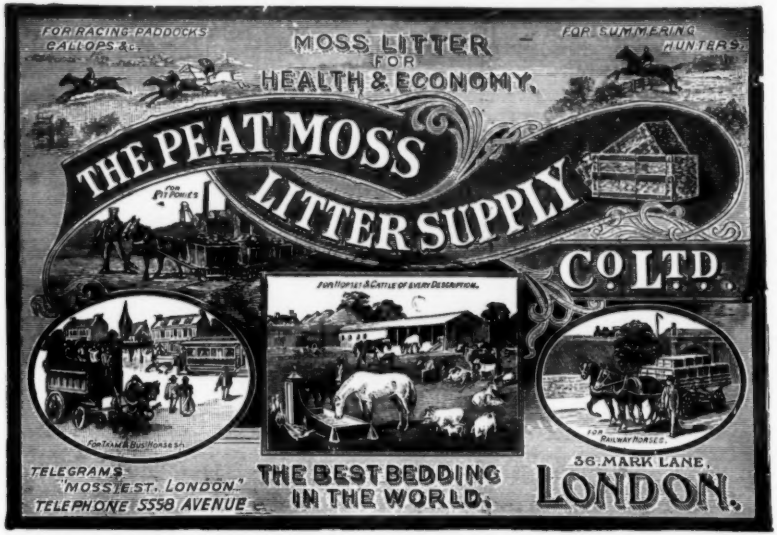
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The "COUNTY GENTLEMAN," *April* 1, says: "Chief among the merits of Peat Moss are the ease with which it is stored; the small danger it offers as regards fire compared with Straw; non-conductivity; the great powers of absorption; its antiseptic properties, and the ease and advantage with which it can be used as Manure in town gardens and in the country."

In 1895 Lignières made a series of investigations into the true etiology of equine pneumonia, and demonstrated that a large number of pulmonary and pleuro-pneumonic affections supervened on typhoid fever, and that the cocco-bacillus that he discovered would, when pure, cause pneumonia. It is, however, difficult to demonstrate it *post mortem*, but he found that even administered by the mouth that it gave rise to pneumonia. This pneumonia was of a different type to typhoid fever, and its cocco-bacillus, "the diplobacteria of Schutz," were present in large quantities.

Lignières (*Bulletin de la Soc. Centr. de Méd. Vét.*, 1897) has shown that this organism is only a form in the evolution of the streptococcus of strangles, also that, contrary to the experience of Schutz, it colours with Gram's stain.

The organism described by Delamotte and Chantemessa, "the streptococcus pneumo-enteritis of Galtier and Violet," had been proved to be identical with the bacteria of Schutz. This author says: "We find the streptococcus of Schutz also known as the Schutz bacteria and the streptococcus of strangles, in the organs and pathological products from horses dead from pneumonia à frigore, infectious pneumonia, stable pneumonia, pneumo-enteritis, pleuro-pneumonia, pleurisy, and broncho-pneumonia or influenza."

There appears to be a doubt in the mind of the author, as he adds: "The pathological *rôle* of Schutz's streptococcus in pneumonia remains to be proved."

On the contrary, the microbe of typhoid fever (*cocco-bacillus* or *Pasteurella equi*), which is very difficult to demonstrate, is constantly present and appears, no doubt, to be the active agent in pneumonia.

Lignières has experimentally reproduced streptococci pneumonia with the typhoid cocco-bacillus, but it does not develop quite in the same way as when acquired naturally. The pleura is always much implicated, and the streptococcus and the Pasteurella are found together. Lignières concludes: "It appears to be clearly proved that infectious pneumonia is only a manifestation of typhoid fever, in which there are localised pulmonary lesions. Typhoid pneumonia is not necessarily infectious and sporadic cases of both it and typhoid fever are seen."

According to Lignières, pneumonia is allied to Pasteurellosis.

Nocard and Leclainche (*Maladies Microbiennes*, 3rd edition) adopt Lignière's views, and while recognising the clinical difference consider all forms of pneumonia to be due to a "Pasteurella," and point out that he (Lignières) not only found the ovoid bacteria in pneumonia with infectious pleuro-pneumonia and typhoid, but also in it when caused by strangles and cold.

From a clinical point of view it is difficult to realise that all forms of pneumonia are due to the same cause. Most of the other writers have made a minute division of it, based entirely on anatomical and pathological lesions, but in reality in the same outbreak many forms are seen when, no doubt, they are all due to one cause.

Practically, pneumonia is seen under two different conditions:—

(1) In young horses in places infected with strangles, where, in conjunction with the catarrhal and septicæmic forms, cases of lobular pneumonia are seen, and in which the term "strangles pneumonia" seems applicable. This form is common and its development is

normal; it is in certain cases fatal from complications such as pleurisy, suppuration or pulmonary gangrene.

(2) In old horses, where it is incorrectly termed typhoid fever, whereas "grippe" or "influenza" would be much more appropriate, for the term typhoid fever gives rise to confusion with the disease of the same name in man, whereas they have no resemblance. In the horse the disease is characterised by respiratory complications: rhinitis, laryngo-tracheitis, bronchitis and greatly increased temperature, which, however, is only temporary. There are, however, a certain percentage of cases that are distinctly fibrinous, and the number of fatal cases varies in different outbreaks, being more numerous in young animals.

The disease exists as an endemic, and is characterised by periodic outbreaks, and in common with grippe in the human being it generally attacks the respiratory system, abdominal complications being almost unknown in the horse. Articular symptoms (*pseudo rheumatism*) are frequent, and in the benign form recovery takes place in three or four days, but in some attacks gangrene of the lung is frequent. The term pneumonia of grippe seems applicable in this form.

The question arises, Is the enzootic that has been prevalent for several years identical with true equine typhoid fever, such as was seen in 1881-82 and 1890, but clearly it is not. These epidemics were virulently contagious and had special symptoms, the extreme prostration, great flow of tears, and cough, and the frequency of intestinal complications serve to distinguish the two, and it is fourteen years since severe typhoid fever has been seen in Paris.

It may be that the present disease is the original one in an attenuated form and this supposition Lignière's observations seem to confirm; also, it has led Dieckerhoff to class influenza into three groups:—

(1) Pferdestaupe, or true typhoid fever.

(2) Brustseuche, or infectious pneumonia.

(3) Scalma, or infectious bronchitis, a benign form of the same disease that is frequently seen as a sequela, and much resembles grippe in man.

Simple pneumonia, *à frigore*, need not be considered, as in all probability it is an attenuated form of one of the other varieties.

The ordinary acute pneumonia of the horse can be divided into three classes:

(1) The pneumonia of strangles.

(2) The pneumonia of grippe.

(3) Traumatic pneumonia from the presence of a foreign body. According to Lignières, the first two, which are the most common, are due to one and the same cause, viz., the streptococcus of strangles, and which is transferable.

This theory no doubt has a great deal in it, and is supported by what takes place in other animals, for in the ox simple pneumonia is never seen without pleurisy.

In the dog pneumonia is seldom seen except as a complication of distemper, and is caused by a specific organism; in fact, it bears a close resemblance to equine strangles, as once past the critical period of life the dog possesses great immunity against it. In the pig pulmonary hepatization is a specific disease (*schwein eseuche*).

It appears, therefore, that in the domestic animals pneumonia is only a local manifestation of a general infection which may attack any region or group of organs, and the reason why the symptoms show themselves in the lungs is that they are the purifying or filtering apparatus of the blood, and that the deleterious or noxious agent is retained in them.

It is from the same cause that in pyoremia the lung is the organ most often affected, and the example shown in glanders is suggestive. We know from the experiments of Nocard that contamination by Lœffler's bacillus is usually effected through the digestive system, and that the most common way that pulmonary glanders is contracted is by the stomach, the virus being taken in with the drinking water. On making a *post-mortem* examination of such animals the digestive system is found to be perfectly healthy; the organism having passed through it without leaving any trace behind, it penetrates into the circulation and is arrested in the lung, and it is only reasonable to suppose that what takes place with the bacillus of glanders will also take place with other micro-organisms, and that a large number of those that affect the lungs arrive there through the digestive system.

If we agree with Lignières that the different forms of pneumonia in the horse are a Pasteurellosis, we must admit the same as regards strangles. No one can deny that strangles pneumonia is not on the increase, and Lignières distinctly states that he considers it a Pasteurellosis due to a cocco-bacillus. Practically the strangles and grippe form of pneumonia give immunity to a second attack, but not from each other (Bourges: *Bull de la Soc. Centrale de Méd. Vét.*, 1899, page 227), as the pneumonia of grippe has been seen in young horses just recovered from that of strangles.

If a previous attack confers immunity it is only logical to suppose that the same can be brought about artificially, and on this Lignières was engaged previous to his departure for the Argentine. An experiment that deserves notice was made by the Compagnie Générale des Voitures, from October 4, 1897, to May 12, 1898: half the new horses were vaccinated with the attenuated cocco-bacillus in pairs, one being vaccinated, the other not.

On October 31, 1898, 254 newly purchased horses had died from chest complaints; 158 had not been vaccinated; 96 had been vaccinated twice; and 7 died from the vaccine being too virulent. So that, omitting these, the death-rate was 6·01 per cent. non-vaccinated and 4·03 per cent. vaccinated. (Lignières, *Bulletin Soc. Cent de Médicine Vétérinaire*, 1898, page 857.) These figures would appear to be slightly in favour of vaccination, but they are not conclusive.

Some similar experiments have been carried out by MM. Vallée and Carér (*Pathogenia du Accidents Consécutifs aux Vaccination, Bulletin Soc. Centrale de Méd. Vét.*, 1904, page 467), which tend to show that vaccination is dangerous when carried out in contaminated centres.

At one time it was thought that serum from animals that had recovered from a severe attack of pneumonia was capable of giving immunity to those that had never been attacked. Hell injected 40 grammes of this serum into horses and obtained what appeared to be

encouraging results, but further experiments on a large scale in the German army did not confirm them, and the plan was abandoned.

Attempts are now being made to obtain a serum that has a higher degree of activity than that obtained from animals that have become immune naturally; but without wishing to be pessimistic, it must be confessed that there are great difficulties in the way.

Lignières considers that the organism is inoffensive if the system has not been contaminated with the streptococcus of strangles, and we know that we can obtain a serum that is efficacious against the streptococcus. It would, therefore, appear logical to counteract the ill effects of the Pasteurelloses by antistreptococcic serum, and use this method for all the various types of pneumonia, or, at all events, in those in which the streptococcus plays an active part. Good results have already been obtained (Nocard, *Bulletin Soc. Centr. de Méd. Vét.*, 1903, p. 309) by M. Rohr, especially in gangrenous pneumonia.

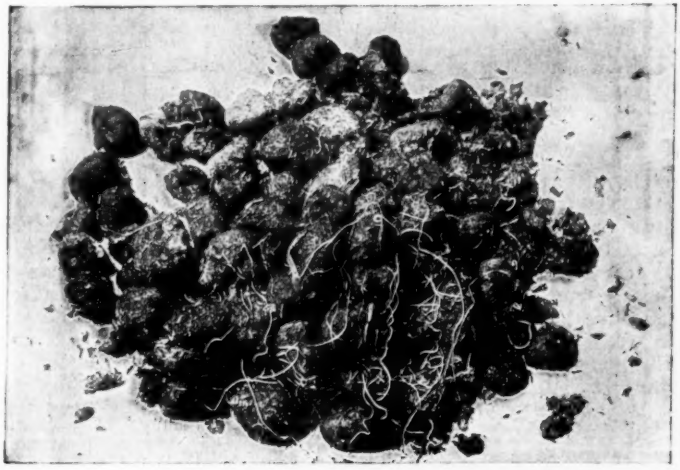
M. G. Joly (Joly, *Malades du cheval de troupe*, p. 78), writing about this method, says that he has been in the habit of using antistreptococcic serum in cases of infectious pneumonia with good results in doses of 160 cc. in six days.

Up to the present antistreptococcic serums have not been specially adapted for the horse, they have been prepared for the human being (Rosenbach Féhleisen type), and it is only just lately that any polyvalents have been produced, but it is hoped that a very active one will be obtained which may arrest the development of the disease, if employed in the earliest stages.

The well-known experiments of Delafond have shown that cold alone will not cause pneumonia, but these were made on seasoned subjects, and if they had been young animals that had never been attacked it is probable that the results would have been very different. M. Joly (*Maladies du cheval de troupe*, p. 38) points out that in the Russian Remount Department, despite the mortality from strangles, that from pneumonia in young horses is very great, but only during the winter. Dürck (*Deutsche Archiv für Klin. Med.*, 1897) produced pneumonia by exposure to cold, and demonstrated the existence of pathogenic organisms in the respiratory system of animals otherwise perfectly healthy. Lignières also has found them in forage of good quality, and it is easy to understand how in young animals that are receptive, and in old ones that have lost their powers of resistance, pneumonia can be induced by cold, which seems to destroy the defensive powers of the lungs in the same way that section of the pneumogastric nerve will. In the words of Nocard, "We are too much inclined to overlook the fact that micro-organisms of themselves are seldom sufficient to give rise to disease. That they are is wide of the truth, and the notion that the germ theory will supplant the old etiology is false; all that it does is to throw a light into what otherwise would be an obscure point."

(*Revue Générale de Médecine Vétérinaire*, January 1, 1904.)

THE UNIQUE CLAIMS OF MOLASSINE MEAL PROVED.



Photograph of a portion of the manure from "IRENE" before being fed with Molassine Meal.

It is a common thing for horse-owners and stock-feeders to write to the Molassine Co., Ltd., pointing out how much better some other foods are from an analytical standpoint than Molassine Meal.

The reply is, that **it is not what an animal eats, but what he digests,** that is of service. If horse-owners and others would but examine the manure in their stables, they would often find that a large proportion of the food given to animals passed through in an undigested state, and that its money value might just as well have been thrown away. This represents a serious loss during the course of a year, and the intelligent stock-feeder should give it his careful attention.

The photograph represents manure from "Irene," before feeding on Molassine Meal, and it will be seen that it contains a large proportion of oats and beans which have come from the animal just as they were eaten.

The photograph shows that the oats and beans had begun to germinate, and distinct growths of oats and beans are to be seen, showing clearly that on account of the low vitality of the animal, fermentation and other stomach troubles had set up, which affected the digestive organs and made them incapable of performing their proper functions.

PRICE: £6 15s. per ton, or 7s. 6d. per cwt. at Works, LONDON or LIVERPOOL.

BEWARE of other foods with similar names, which are only IMITATIONS

Manufactured by

HENRY TATE & SONS, Ltd., Sugar Refiners, LONDON and LIVERPOOL,

UNDER LETTERS PATENT EXCLUSIVELY FOR

THE MOLASSINE Co., Ltd.,

36, MARK LANE, LONDON, E.C.

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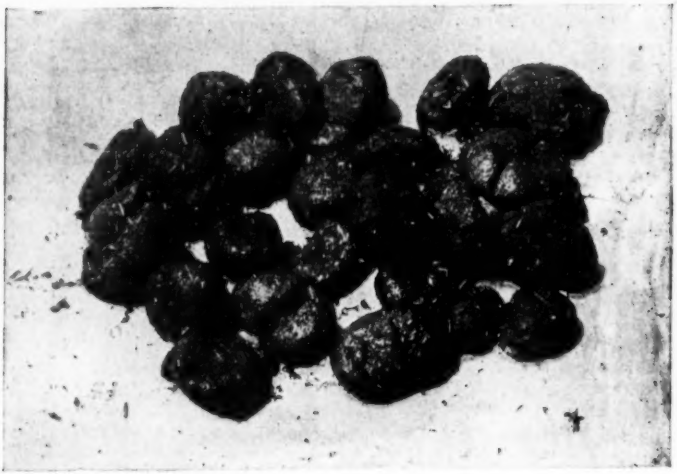
THE UNIQUE CLAIMS OF MOLASSINE MEAL PROVED.



Photograph of Manure from "IRENE" after feeding with Molassine Meal.

This photograph shows manure some weeks after "Irene" had been fed on Molassine Meal, and after it had lain sufficient time for germination to take place in case there had been any undigested grain pass through. It is quite free of any cereals and is perfectly healthy and inodorous, showing that Molassine Meal has had its usual effect upon the stomach and digestive organs, and had brought the animal to a perfectly healthy condition, **and able, as we claim, to obtain the full amount of nutriment of his entire food,** to the financial benefit of the owner.

Another mistake buyers sometimes make is that they attempt to compare the value of Molassine Meal with cake or other food. Our answer invariably is, that you cannot compare Molassine Meal with any other food, as there is no comparison. **It is not only its actual feeding value, but the tremendous additional value it gives to all other foods, in consequence of its antiseptic and digestive properties.**

Horse-owners and stock-feeders can test this feature for themselves, when they will have the same results.

PRICE: £6 15s. per ton, or 7s. 6d. per cwt. at Works, LONDON or LIVERPOOL.

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SEQUEL OF NEUROTOMY.

BY J. J. WAGTAR.

THE author discusses the results of neurotomy and accidents that may occur in practice, meaning loss of the hoof, hypertrophy or horn, rupture of tendon, fracture, derangement of the sensory and vaso-motor system, hyperemia, &c. He considers that increase of temperature in the unnerved foot indicates a severe and urgent danger, as in post-operative accidents that only take place after a lapse of time, the temperature is generally lower in that part than in the opposite one. Increased temperature and derangement of the circulatory apparatus, however, only play a slight part in causing accidents. In resection of the medium there is no greater danger of accidents than in plantar. Grohn and Reitzberg have found a difference in the temperature of the nerved and unnerved foot, and in the dog, contrary to Schiff, noticed slight elevation.

He does not think that alteration in or defective nutrition following neurotomy is the determining cause of rupture of the tendons and that the term " trophic alteration " was invented to hide ignorance. He thinks that all accidents following the operation are the natural result of the progressive development of pre-existing lesions; and that neurotomy does not cure or remove such lesions. Most of the accidents he has seen can be accounted for by this theory, and in proof he points out that if it is performed on a healthy limb that such will not take place.

In navicular disease he points out that the bone is the seat of a rarefying ostitis that sooner or later will cause fracture, and he quotes four cases. He has seen cases of ostitis that are not the result of neurotomy but follow on development of lesion of the epiphyses, the articular surfaces and periostitis. The periostitis caused by gathered nails is seen after neurotomy, but the operation cannot be blamed.

(*Tijdschrift voor Veeartsenijkonde*).

Reviews.

REPORT OF THE BOARD OF AGRICULTURE AND FISHERIES FOR 1904. Printed by Darling and Son, 34, Baker Street, E. Price 11d.

This report, which usually appears several months later than the end of the year to which it legitimately belongs, consists of two parts, viz., that of the Chief Veterinary Officer, and secondly, that of the Assistant-secretary for the Animals Division.

Mr. Cope, the Chief Veterinary Officer, is able to congratulate the country on the continued absence of pleuro-pneumonia and foot-and-mouth disease, and also upon the decrease of swine fever. Of the latter disease, 9,147 reports of suspected cases were received by the Department, but only 1,196 were confirmed by the officers of the Board. In 1894 compensation was paid for no less than 5,629 swine which were slaughtered by order of the Government, and it is a matter of congratulation that in this year, only ten years later, the numbers have fallen to 1,196 outbreaks, with, however, still some 5,603 swine slaughtered as diseased or having been in contact.

XUM

The chief unsatisfactory feature at the present time is that, although the outbreaks in Great Britain have been very materially reduced, the distribution throughout the different counties is almost as wide as it was in 1894.

Government commissions have sat to make inquiries into the origin and pathology of this disease, and the report of the latest committee dealing therewith is promised in the near future.

Anthrax is very much on the increase. Ten years ago only 494 outbreaks were reported, but in 1904 they had risen to 1,049. Cattle and pigs have been the animals principally affected. An important factor in the spread of the disease has been the ignorance of owners in regard to the danger of cutting up the carcase of a beast which has been suspected to have died of anthrax, and it is a matter for regret that owners have not acted more universally upon the suggestions contained in the leaflets which the Board of Agriculture distributed broadcast all over the country.

Epizootic lymphangitis has been introduced into England by army horses which have come from active service in South Africa. Although outbreaks have occurred in civilian stables, the disease has been principally confined to army horses and a special endeavour has been made, by means of an order issued to members of the veterinary profession, to draw attention to the existence of this disease and to aid them in differentiating it from the farcy form of glanders. Altogether only 123 cases had been reported up to the end of 1904, and out of these 106 occurred in military stables.

Glanders is admittedly on the increase, and it is quite time that something was done to grapple with this loathsome disease. In 1874 there were only 502 outbreaks with 633 horses attacked, but in 1904 the outbreaks had increased to 1,529 and 2,658 horses were killed as glandered.

It is necessary, in order to stamp out this disease, that power should be given to the authorities to test and deal summarily with all animals which have been in contact.

By the use of the mallein, as Mr. Cope suggests, the diseased horses which have been in contact with an infected animal could be readily picked out and glanders might be definitely got rid of within a few years. Pleuro-pneumonia cost the country about £218,510, but with that disease there was no agent of similar diagnostic power to that of mallein for discovering glanders, and it was necessary to kill every animal which had been in contact with a beast suffering from pleuro. It is reasonable to conclude that glanders might be stamped out at much less cost, and the country would undoubtedly be very much benefited by its disappearance.

Sheep-scab has been less prevalent in 1904 than in any previous year since 1889, and the outbreaks, although still too common, are one-third less than in 1903.

Rabies has been entirely extinguished in Great Britain, no case having occurred during 1904, and from the tenor of the report it is pretty evident that there is no intention to relax the stringent quarantine regulations which are at present in force. In this the Board will have the support of the entire medical and veterinary professions.

Contagious abortion, navel-ill, braxy and other diseases, are briefly touched upon and are well worth further notice.

The portion which is written by the Assistant-secretary, in dealing with the diseases, is couched in much the same terms as that of the Chief Veterinary Officer, and chapters are added on the work of the inspectors, the live-stock markets, casualties in the cattle-carrying trade, &c.

The report closes with an appendix of circulars and statistics upon matters of interest to animal owners, and altogether is a very useful little work of reference.

SPECIAL REPORT ON DISEASES OF CATTLE. By Drs. PEARSON, MURRAY, ATKINSON, LOWE, HARBAUGH, LAW, DICKSON, MOHLER, TRUMBOWER, SALMON, SMITH, AND STILES. Published by the United States Department of Agriculture, Bureau of Animal Industry, Washington, U.S.A.

Although called a report, the volume is one of 424 pages, containing sixty-four illustrations, most of which are coloured. In the preface Dr. Salmon, chief of the Bureau of Animal Industry, states that the report has been prepared for the farmer and stock owner rather than the student or veterinary surgeon, but we venture to consider that both the latter can read it with much profit. There has long been a want felt of a text-book dealing specially with the diseases of cattle in the English language, and to a great extent the American publication will, we think, supply the want. It is true, as Dr. Salmon says, that the information is stated in brief and plain language, but for the busy practitioner it is none the worse for that.

The novel feature of the book is that each section has been written by a different author, who is a specialist on the subject, the table of contents being:—

Administrations of medicines, Diseases of the heart, blood-vessels, and lymphatics, Leonard Pearson, B.Sc., V.M.D.—Diseases of the digestive organs, by A. J. Murray, M.R.C.V.S.—Poisons and poisoning, Bones, diseases and accidents, by V. T. Atkinson, V.S.—Non-contagious diseases of the organs of respiration, by Dr. W. H. Lowe—Diseases of the nervous system, by W. H. Harbaugh, V.S.—Diseases of the urinary organs, Diseases of the generative organs, Diseases following parturition, Diseases of young calves, by James Law, F.R.C.V.S.—Surgical operations, by W. Dickson—Tumours affecting cattle, Mycotic stomatitis in cattle, by John R. Mohler, A.M., V.M.D.—Diseases of the skin, Diseases of the foot, Diseases of the eye and its appendages, Diseases of the ear, by M. R. Trumbower, D.V.S.—Infectious diseases of cattle, by D. E. Salmon, D.V.M., and Dr. Theobald Smith—The animal parasites of cattle, by C. Wardell Stiles, A.M., M.S., Ph.D.

Being written in America for the use of Americans, some of the practice is different to English. The chapters on infectious diseases, particularly tuberculosis and actinomycosis, and diseases of the urinary organs, are valuable, as an amount of matter that is widely scattered over foreign professional literature, and is altogether beyond the access of the ordinary practitioner, has been brought together in a condensed form.

REPORT OF THE CHIEF VETERINARY SURGEON OF THE CAPE DEPARTMENT FOR AGRICULTURE AND HIS ASSISTANTS FOR THE HALF-YEAR ENDING JUNE 30TH, 1904. Printed by the Cape Times Printing Co., Cape Town.

This report, which forms most interesting reading, is compiled

from the work carried out by the veterinary staff, under the able guidance of its chief officer, Mr. Duncan Hutcheon, M.R.C.V.S. South Africa appears from the report to possess all the diseases of modern civilisation, together with a number of others from which we are luckily spared.

The report deals with rinderpest, swine-fever, mange, osteoporosis, malarial catarrh of sheep, glanders, epizootic lymphangitis, contagious pleuro-pneumonia, anthrax, redwater, blackquarter, and a number of other diseases whose appearances have not been recognised by English practitioners. They are all reported upon, and in other pages we have given extracts, although we should advise strongly that practitioners would get the report and read it for themselves.

RATIONAL FEEDING OF THE DOMESTIC ANIMALS. By M. RAOUL GOUIN and DR. P. REGNARD, Director of the National Agricultural Institute of France. One vol., 496 pages, 5 francs. Baillière and Sons, 19, Rue Hautefeuille, Paris.

M. Gouin places the facts known regarding the feeding of animals in a concise form so as to obtain the maximum results with a minimum cost, and to practically apply the latest scientific discoveries.

The first part of the book is devoted to the history and theory of feeding, digestibility, and substitutes for ordinary food stuffs.

In the second part the different forage plants and their mode of cultivation are described, with sections on roots, grains, fruits, and refuse of manufactures, both animal and vegetable, that can be used for food. There are chapters on the preparation of foods, the different feeding stuffs, their advantages and disadvantages, quantities, and modes of manufacture.

The third part is devoted to the special feeding of different animals, foals, stallions, brood mares, working horses, asses, mules, calves, milch cows, working and fattening oxen, lambs, ewes, rams, and flocks of sheep, goats, young pigs, boars, brood sows and fattening pigs.

Tables also are given of the relative chemical composition of the different food stuffs. The book is a useful one and can be studied with profit by anyone interested in the subject.

THE ANNUAL REPORT OF THE BACTERIOLOGIST TO THE NATAL GOVERNMENT (MR. H. WATKINS PITCHFORD, F.R.C.V.S.), for the year 1903, that we have just received, is, in more ways than one, an interesting publication. The diseases which he has chiefly been engaged upon have been horse sickness and bubonic plague. Doubts having been expressed as to the efficacy of the vaccine prepared against quarter evil, a careful enquiry was made amongst stock-owners; the results are contained in Appendix A, and it is satisfactory to find that there is an overwhelming consensus of opinion as to its benefits, and that there is an increased demand for it, viz., 11,520 doses in 1902 and 17,995 in 1903. Serum for snake bite is also prepared, and the demand for it is increasing. Mr. Pitchford points out that the work at the laboratory is largely increasing. Reports on morbid tissues and fluids have been made for the Public Health and Veterinary Departments and for private medical practitioners; also for the Criminal Investigation Department, examinations for the

diagnosis of enteric fever, diphtheria, and malaria; and analyses of various water-supplies.

The following have been sent from the laboratory:—

Quarter evil vaccine	16,985 doses
Mallein	4,824 ,,
Tuberculin	2,462 ,,
Locust fungus	480 tubes
Anthrax vaccine	24 doses
Tetanic serum	38 ,,
Anti-venomous serum	83 ,,
Rinderpest serum	500 ,,

The investigation into the nature of bubonic plague is a remarkable piece of work, and one that Mr. Pitchford is to be congratulated upon. He has made many new discoveries, as to the life and habits of the bacillus, which are not only of high scientific value but also most important from a practical point of view, and it is a matter of the greatest satisfaction that a member of our profession should have been able to make these important discoveries. The Veterinary Profession is evidently more appreciated in Natal than at home, this bearing out the old saying that "a prophet is not without honour save in his own country."

ROYAL COLLEGE OF VETERINARY SURGEONS.

At meetings of the Board of Examiners held in Edinburgh and Glasgow, on May 19, for the written, and in Edinburgh on May 23, 24, and 25, for the oral examinations, the following gentlemen passed their final examination and were admitted members of the Royal College of Veterinary Surgeons:—

Name.	College.
Mr. J. McC. Barry	Edinburgh
,, C. W. Cartwright (Registers on June 25)	,,
,, C. R. Chadwick	,,
,, F. Drinkwater	,,
,, W. Laing	,,
,, A. E. Massy	,,
,, J. H. McCrea	,,
,, S. Robson	,,
,, H. A. Stewart	,,
,, A. Taylor	,,
,, G. Taylor	,,
,, R. W. Thompson (Register on Nov. 8)	,,
,, A. E. Willett	,,
,, C. Elphick	Liverpool
,, H. W. Stevens	Edinburgh
The following passed their third examination:—	
Mr. A. McCann	Glasgow
,, W. Hill	,,
,, W. D. Blair	,,

Name.	College.
Mr. J. Taylor (Second Class Honours)	Edinburgh
,, H. Andrew	,,
,, J. Andrew	,,
,, J. Cameron	,,
,, W. T. Christie	,,
,, J. A. Gault	,,
,, G. H. Jelbart	,,
,, A. McTurk	,,
,, J. A. McLauchlan	,,
,, J. H. Primmer	,,
,, L. L. Steele	,,
,, J. Thomson	,,
,, C. E. Waddy	,,
,, W. R. Watson	,,
,, W. Walker	London

The following passed their second examination :—

Name.	College.
Mr. W. Reid	Glasgow
,, E. Meikle	,,
,, J. Taylor	,,
,, W. Henderson	,,
,, W. K. Clark	Edinburgh
,, H. S. A. Dunn	,,
,, P. Haugh	,,
,, W. A. Grant	,,
,, E. C. Howard	,,
,, T. Mercieca	,,
,, AMcKenzie	,,
,, J. G. McGregor	,,
,, A. Aiden	,,
,, P. B. Noble	,,
,, A. E. Roberts	,,
,, P. T. Saunders	,,
,, J. C. Storie	,,
,, T. Wilson	,,
,, A. M. Wylie	,,

The following passed their first examination :—

Name.	College.
Mr. C. McNeil (Second Class Honours)	Glasgow
,, D. Campbell (Second Class Honours)	,,
,, J. Rae (Second Class Honours)	,,
,, H. Gilmor (Second Class Honours)	,,
,, C. F. Johnston (Second Class Honours)	,,
,, C. A. Murray (Second Class Honours)	,,
,, W. Kennedy (Second Class Honours)	,,
,, J. Dunlop	,,
,, J. Taylor	,,
,, N. B. Francis	London
,, E. Armstrong	Edinburgh
,, W. Brown (Second Class Honours)	,,
,, F. Bradley	,,
,, G. T. F. Budge	,,

Name.	College.
Mr. W. E. Charlesworth	Edinburgh.
„ D. R. Crabb	„
„ D. Hannay	„
„ F. Hogg	„
„ J. R. A. Jones (Second Class Honours)	„
„ A. Matthew (Second Class Honours)	„
„ J. W. Morrow (First Class Honours)	„
„ E. J. Nicholson	„
„ J. Robson (Second Class Honours)	„
„ W. A. Smith	„
„ J. N. Soutar	„

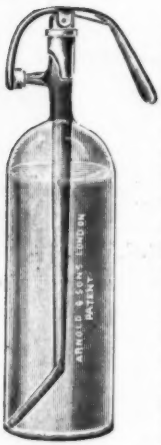
R. Rutherford, F.R.C.V.S.,
Sec., Board of Examiners.

NEW MOLAR TOOTH FORCEPS.

Sir,—Some few years ago I brought to the notice of the Veterinary Profession a pair of molar forceps which I had found in my practice of great service in the extraction of diseased molar teeth. Acting on my suggestion, Messrs. Arnold and Sons, West Smithfield, London, with their usual skill, have made for me a pair with additional improvements which I am certain the profession will appreciate. The advantages of the forceps over any others in use are: greater leverage, more effectual grip of the tooth, simplicity of construction, and less assistance required.

I remain,
Yours faithfully,
W. Longhurst, M.R.C.V.S.L.

Hull.



MESSRS. ARNOLD AND SONS, of West Smithfield, London, have been appointed sole agents for the new Ethyl Chloride introduced by Dr. Thilo, of Mainz. Its purity is guaranteed by Dr. Bein, the Government Analyst of Berlin, and it can be used for either local or total anæsthesia. It has no unpleasant after effects. It is supplied in 50-gramme tubes with screw-top, and also in a patent syphon bottle as illustrated, this possessing many advantages over those in use at the present time. The bottle is constructed on the syphon system, and in consequence gives a spray without having to be held on the slant, as with the ordinary; pressure upon the lever takes place on the side nearest to the operator, the hand remaining in an easy and natural position when handling the bottle. The bottle when hastily laid on the table, as often has to be done during operations, cannot roll off and get broken, the larger curve preventing this. This is a great advantage and will be greatly appreciated in practice. The bottles can be refilled.

Notice.

All communications regarding Articles, &c., should be addressed to the Editor, THE VETERINARY JOURNAL, 8, Henrietta Street, Covent Garden, London. Communications concerning Subscriptions, Advertisements, and other business matters, should be addressed to Messrs. Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, London.

Books and Periodicals, &c., Received.

Bulletin Vétérinaire; Journal of Experimental Medicine; Journal of the Royal Army Medical Corps; Johns Hopkins Hospital Reports; Illustrated Kennel News; Board of Agriculture Reports; Recueil de Médicine Vétérinaire; Friedbergeth and Frohner's Veterinary Pathology, vol. ii., Messrs. Hurst and Blackett; Newcastle Daily Journal; La Clinica Veterinaria; Deutsche Tierarztliche Wochenschrift; Berliner Tierarztliche Wochenschrift; Cape Colony Agricultural Journal; Le Movement Agricole; Revue Générale de Médecine Vétérinaire; Recueil de Médecine Vétérinaire; La Mois Scientifique; La Echo Vétérinaire; American Veterinary Review; Standard Chemical Disinfectant, by Wolf Defries, B.A., M.I. Mich.E.; Rivieta de Medicina Veterinaria; Irish Farming World; Western Veterinarian; Fortschritte der Veterinär Hygiene; Pathologie Chirurgicale des Tendons des Muscles et des Nerfs, by J. Padro and C. Cadrac; Annual Dentistry and Diseases of the Mouth, Merillat.

Communications, &c., Received.

Professor Dewar; Mr. Snaith; Mr. Watkins; Prof. Bradley; Lieut. Haigh; Mr. T. Foulkes; Mr. Todd; Mr. E. L. Stroud; Mr. Ascott; Mr. J. B. Young; Mr. Linton.

Supplement to the July Number.

By an error, these diagrams were omitted from Mr. Haskell's paper on "The Ancestry of the Horse," in the July number of THE VETERINARY JOURNAL.

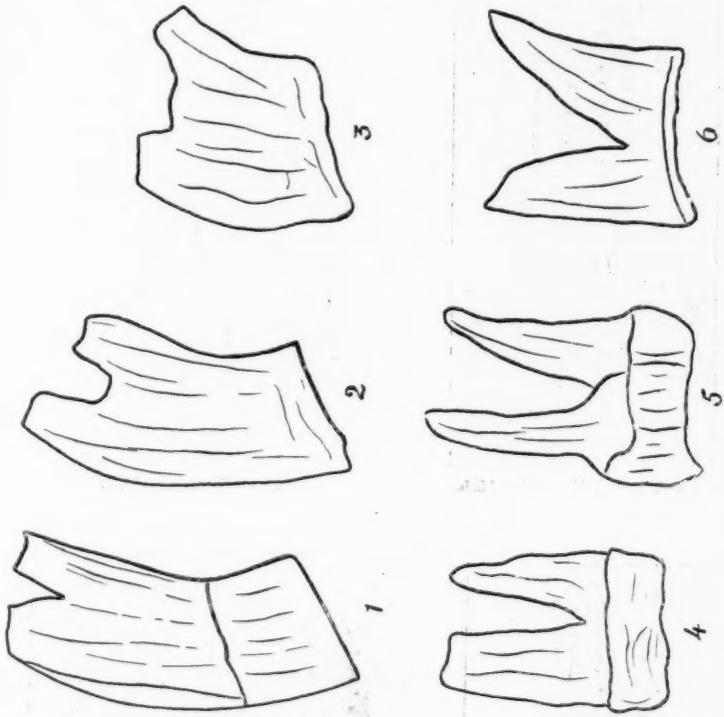


FIG. 1.

1.—Equus. 2.—Pliohippus. 3.—Protohippus and Hipparion.
4.—Miohippus and Architherium. 5.—Mesohippus. 6.—Orohippus.

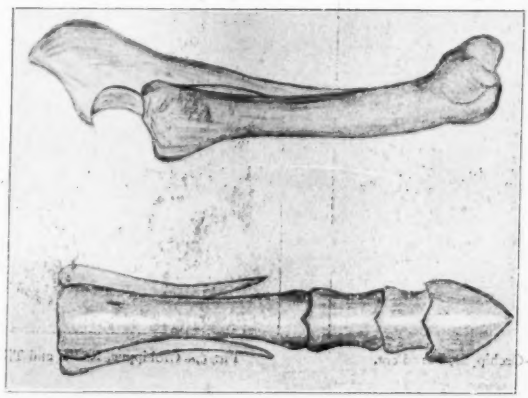


FIG. 2.—Pliohippus, Fore Limb.

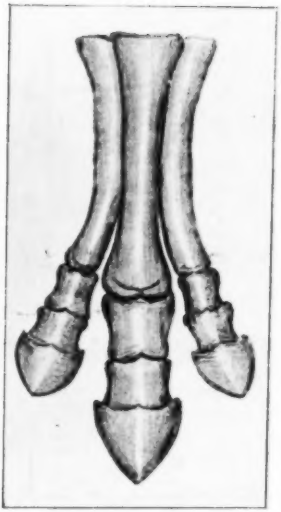


FIG. 3.—Protohippus, Fore Limb.

FIG. 4.—Miohippus, Fore Limb.

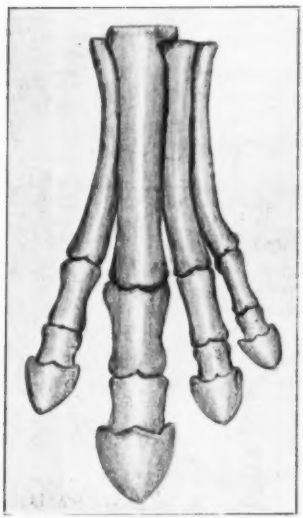


FIG. 5.—Orohippus, Fore Foot.

FIG. 6.—Orohippus, Radial and Tibial Regions.

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